

Engineering Library

Does Carbon Dioxide Rife ¹⁹²¹ Coal Piles? pp. 139-140

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COAL AGE

The World's Accepted Authority on Coal Mining

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July 29, 1926

Price Twenty Cents per Copy



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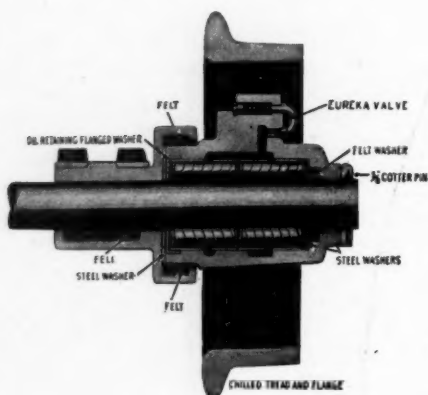
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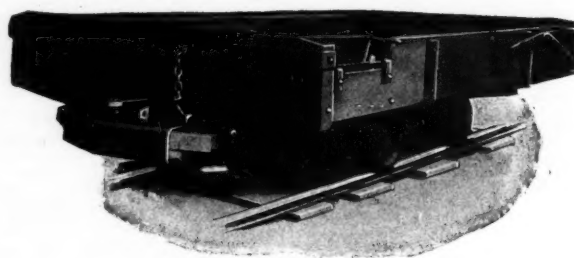


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McGraw-Hill Publishing Company, Inc.

Tenth Avenue at 36th Street, NEW YORK, N. Y.
WASHINGTON, Colorado Building
CHICAGO, 7 South Dearborn Street
PHILADELPHIA, 16th and Parkway
CLEVELAND, Guardian Building
ST. LOUIS, Star Building
SAN FRANCISCO, 333 Mission Street
LONDON, 6 Bouverie Street, E. C. 4, London

Cable Address: "Machinist, N. Y."
The annual subscription rate is \$3 in the United States, Canada, Mexico, Alaska, Hawaii, the Philippines, Porto Rico, Canal Zone, Cuba, Honduras, Nicaragua, Dominican Republic, Salvador, Peru, Colombia, Bolivia, Ecuador, Argentina, Chile, Spain, Panama, Brazil, Uruguay, Costa Rica, Guatemala, Haiti and Paraguay. Extra foreign postage \$3 (total \$6 or 25 shillings). Single copies, 20 cents.

Change of Address—When change of address is ordered the new and the old address must be given. Notice must be received at least ten days before the change takes place.

Copyright, 1926
By McGraw-Hill Publishing Company, Inc.
Published weekly
Entered as second-class matter Oct. 14, 1911, at the Post Office at New York, N. Y., under the Act of March 3, 1879.
Printed in U. S. A.
Member Audit Bureau of Circulations
Member Associated Business Papers, Inc.
Number of copies printed this issue, 10,378

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Publishers of
Coal Age
Engineering and Mining Journal
Engineering News-Record
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Chemical and Metallurgical Engineering
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American Machinist—European Edition
(Published in London)

From Many Sources

Only by learning of the developments in other fields and by finding out what those fields are doing can progress be made. Most of us know a little about what goes on around us but to learn of the advances in other districts we have the technical press.

Can Burn Coal Also

Frank H. Kneeland, associate editor of *Coal Age*, has been in Illinois, where he was much impressed with the Cambria, or No. 12, plant of the Madison Coal Corporation, which has a powerhouse in which the most approved methods of combustion have been introduced. He will have an article on this plant in next week's *Coal Age*. Unlike some companies the Madison company knows not only how to produce but how to burn coal also.

Those Tracks!!!

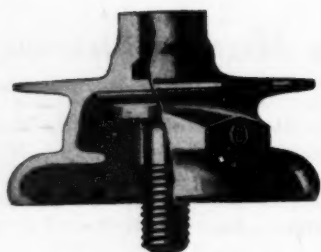
Fred C. Hohn of Scranton, Pa., discusses trackwork at mines. He shows how it should be constructed and maintained. Too often today, the heading driver lays it, throws a little rock or bone on it and there it remains resting on clay, free to shift, soaked with water, with corrosion gnawing at the rail flanges, with wheels hammering down the joints but suffered to remain till a wreck occurs when something quick is done but nothing that is effectual. When you read Hohn's remarks you will look upon track with a new idea. It's one of those homemade things around the mine, and it doesn't reflect much credit on its manufacturer.

Conveyors

R. A. Suppes, formerly of Johnstown, Pa., gives further details about his work with conveyors—just the practical details of the operation. Many are trying conveyors and want to know how to handle them.

Sydney A. Hale is back from Atlantic City, where he has been attending the Lake Cargo Coal Rate hearing which he discusses in this week's issue supplementing his story of last week. Paul Wooton describes exclusively this week the latest developments in the Bureau of Mines, which is now preparing to hang up the new chart prepared for it by the Department of Commerce.

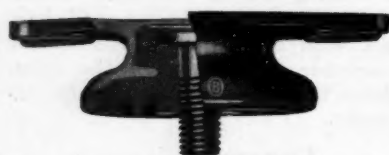
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COAL AGE

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Devoted to the Operating, Technical and Business
Problems of the Coal-Mining Industry

R. DAWSON HALL
Engineering Editor

Volume 30

NEW YORK, JULY 29, 1926

Number 5

A Diagnosis Is Not a Cure

THOSE WHO would nationalize industry find it a simple task to show the faults of industrial life and then jump briskly to the conclusion that nationalization will cure them. Like the medicine fakirs of earlier days and even of today, they endeavor to inveigle the possible buyer of their wares into an admission that he does not feel entirely well and then they blindly offer their favorite pill without troubling to consider if it, by any possibility, could be of assistance in curing the indisposition.

One of the most frequently deplored evils in the coal industry is overmanning. The advocates of nationalization constantly trot it out, for inspection, but could nationalization cure it as well as the present private ownership? Surely the Government would not discharge workmen galore without finding them new employment. The mine-worker nationalizationists certainly would not advocate that, nor would it please those who have been drawn to favor nationalization because it has seemed likely to mend evil conditions painlessly.

The miners do not want to leave the industry for several reasons, among others, because they do not desire to leave the communities in which they live, because they enjoy the work and because they find it furnishes them with better remuneration than other forms of labor. The cure for overmanning must be through a control of labor and that, as we understand it, is not meditated by those who advocate nationalization. They hope to remedy the situation by a control solely of the instruments of production; this, in face of the fact that in Russia the control of those instruments has proved unavailing without a drastic control of the labor by which alone the instruments of production can be put into effective operation.

Burn More Coal

IN ENGLAND, the *Daily Herald*, a labor organ, has been advocating a "Burn More Coal" campaign, with which all will have sympathy. The *Herald* says that working-class families burn only about a long hundred weight of coal (112 lb.) a week. With a winter as long as ours, that consumption would be equivalent to about 2,912 lb., but in Great Britain with its short winter it represents only about half as much and as the coal is less efficiently burned it probably gives less heat than a half a short ton gives the American workman. That is a quantity of coal wholly inadequate for comfort.

We disagree with the *Herald* in believing that the workman alone should be urged to increase his consumption of coal. The well-to-do also endure too much of the rigors of winter, and as they have the wherewithal to buy coal it might be well to aim the campaign at them rather than at the workman who has to restrain

his desire for comfort lest he should get more luxury of one kind, only to lose what he has of another.

In the United States such a campaign would be of little value. Most houses are already kept too warm for health. However, it would be well to extend the period of heating especially in the spring of the year. Fires are extinguished too early and many colds and some pneumonia cases result. There are the farmers, also, who heat only a few rooms and these none too well. Their houses are largely warmed with wood fires. They might well be urged to burn coal and where they do burn it to consume more of it. What the farmers of America and the citizens of Great Britain need to do is to introduce furnaces which burn coal and afford real comfort. Unfortunately that involves a large expenditure for piping and radiators, so the progress must be slow, but it is an end not to be forgotten. To those who are using stoves in America and open fires in England the advice to burn more coal and burn it in more suitable equipment is well worth heeding. It means almost as much to the consumer as to the miner.

Charts of Functions

SPEAKING at the West Virginia Coal Mining Institute, L. W. Brown laid great stress on every man knowing his relation to the company organization and recommended that a chart be made to that end. He gives one, and it leaves us wondering, for nowhere in it can be found the mining engineer, the safety executive or the explosives engineer. In the chart are only an outside foreman, a master mechanic and a chief mine clerk all equally subordinate with the mine boss to the superintendent and assistant superintendent, but surely a big mine is not thus simply staffed.

The mine foreman has of late years been furnished with much assistance. The law still gives him the right to direct the operation of the mine regardless of any orders, but nowadays he is aided by a sheaf of standards and he has a lot of electrical equipment that he does not at all understand. He may be given charge of only the underground workings and have limited responsibilities even there.

He is gradually giving way to specialists and limiting himself to directing compliance with rules and specifications which they have framed. He may leave the building of tracks and the scheduling of trips to others reserving only his powers to enforce safe operation. The ordering of loading machinemen and gatherers may be left in the hands of men with stop-watches and notebooks. In some cases he no longer hires his own men and does not exercise in full his rights of discharge.

Should there be a catastrophe the control of the mine may temporarily be put in the hands of men from other mines, even though no aspersion be thrown on the foreman, for mine recovery is now another specialty.

He has, indeed, far less varied duties today than in the past. A more competent man than his predecessors and a better technician, he nevertheless is willing to give an opportunity to others to aid him with their peculiar talents, experience and opportunities. His forbears could hardly read a blueprint and certainly could not work by one. He can. He knows more about safety, first aid, mine rescue and recovery, mine gases and a dozen other subjects than the mine foreman two decades back who insisted on being the final arbiter as to every piece of work performed in his mine.

We believe that charts of functions are valuable. They let each man know where his duty lies and delimit his authority and responsibility, preventing many hard feelings, but it will be a more complicated chart than Mr. Brown has outlined or it will not completely serve the purpose of its drafting.

The functions in a modern mine are being differentiated, and only bitterness can result if that fact is not clearly recognized. Even the superintendent is finding that he has to side step and leave some of his authority to others who are specialists in their own line.

The difficulty of making charts hinders their construction. In many jobs the foreman is supposed to take his part in supervision but does not desire to supervise the entire operation. Are his cutters short of power, he must necessarily inform the electrician, who will take his orders as to remedying the condition but who must use his own judgment as to the manner in which the job shall be performed. The motorman is usually under the foreman's control but the number of cars he may haul, and the speed at which he may travel on down grades and other matters of vital importance are determined by those who have plotted the grades and know the capacities of the locomotives.

Rock Problems

ROCK REMOVAL at coal mines has been treated always as an evil that must be endured rather than as a problem to be courageously faced. The rock in roadways and airways has been timbered again and again, it has been inspected and dreaded, but it has nevertheless been left in place to be a continued source of danger. It has blocked airways; it has fallen and disarranged running and operating schedules; it has caused, by reason of the timbering needed to support it, a narrowing of roadways. Where above the weak rock there is a reliable stratum that will stand without timbering, it would seem better to remove by explosives, if necessary, the rotten rock or rock that may become rotten and thus decrease the costs of timbering and ventilation.

But as rock is now handled in most mines this cost would be prohibitive. Coming down in small volumes, great in aggregate but small in daily quantity, no proper means of handling it inside or out have usually been installed. Rock is pulled down or allowed to fall, thrown on one side perhaps and loaded at night or on an idle day. The timbering gets higher and higher, and the effects of fungus get more and more distressing as the mines with age become more and more infected.

With proper machinery for loading, with a suitable bin on the outside, with equipment that will handle the rock from the bin to the dump with efficiency and with suitable places for the dumping of such cars it should be possible by an aggressive instead of a dilatory method

of handling rock to dispose of it once and for all at minimum cost and loss of time.

Should, however, there be at no reasonable level a good reliable roof, protection would have been sought by sloping the sides of the airways and roadways into the form of a triangular arch.

Every mine is a problem in itself. No generalization can be labeled "safe," for there are so many kinds of roof, so many kinds of surface terrain, so many mine conditions. The effect on ventilation of such measures of rock removal would be great. The removal of timbers, the equalization of cross-sectional areas and the elimination of places for gas pockets would be advantages not to be overlooked and—what perhaps would be better still—a reduction in the necessary number of airways to be driven, timbered, inspected and left standing. In some cases the maintenance of these additional airways results in the preservation of chain pillars which it would be better to remove than to leave, for as long as they stand they increase the dangers of creep, crush, gas emission from mined areas and spontaneous combustion.

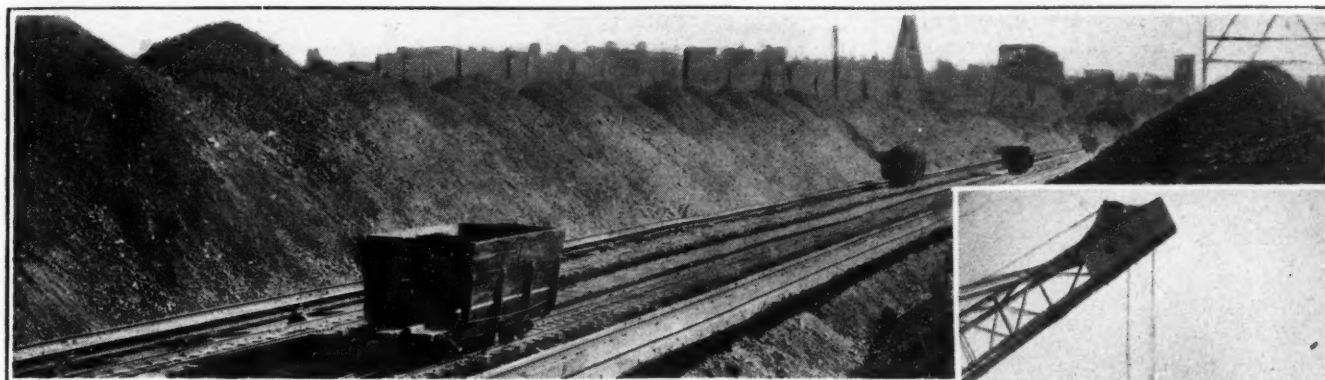
"Derailed-Car Indicator"

TIME WAS WHEN railroads waited till wrecks revealed the weak spots in their roadbeds. They had no system of regular inspection and repair. Only when cars left the track was it admitted that repairs were needed. Probably a rail broke or turned over when the derailment occurred and, of course, that had to be corrected. But the track was soon repaired so that cars could run over it without any absolute certainty of derailment, and the railroad then waited for another weak spot to exhibit itself in a similar manner, that is by another wreck.

But all that is long ago. It has not been that way for a quarter century, perhaps not for fifty years, except on roads for logs. Railroads are kept in condition by regular gangs. They are patrolled and yearly brought to grade and line. In the mines, however, we still follow the old rule which runs, "Fix track only when an accident happens and then do as little as you can get by with." The slogan is, "It is a safe track as long as the cars and locomotives pass over it without a derailment."

Untrained men are put to work on track maintenance; they are supervised by men having no training in track work and having other duties to call them away. The miners lay the track. The ballasting is left to luck—a rock that turns to clay is often all that is used to fill between the ties, and as for the ties themselves they rest on the bottom clay. Nothing is done to drain away water or to remove irregularities in grade. So transportation is as it is and will be till some system is used to make it over, and the mine managements cease to use the time-honored "derailed-car indicator." If mine tracks are not inspected and repaired, wrecks alone will tell the tale.

And that tale they do indeed tell early and often. The repair shop only too frequently affords proof, with its long line of cars needing end-gates and sides—twisted travesties of mine wagons—ranged in a line awaiting surgical care. The car-repair shop is the natural sequel to the mine track. That sequel need not be written here, but the man who has a bad track must have a good and well-manned repair shop as a counterbalance or he will soon cease to produce coal.

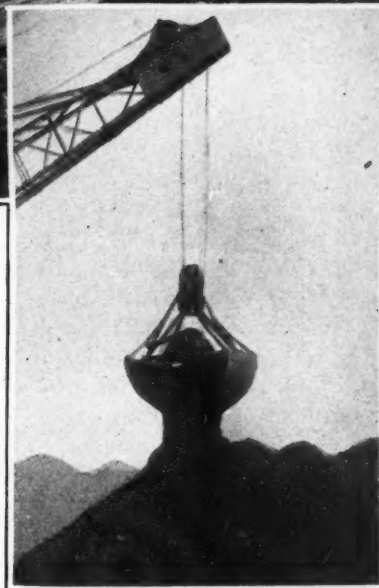


Does Carbon Dioxide Set Fire to Coal Storage Piles?

Easily Liquefiable Gases Like Carbonic Acid Gas Form a Film on Coal More Easily than Gases Like Oxygen—The Formation of Such Films Creates Heat that Starts the Combustion Process

By Homer G. Turner and Eric Sinkinson

Assistant Professors of Geology and Chemistry Respectively
Lehigh University, Bethlehem, Pa.



SPONTANEOUS combustion is one of the big unsolved problems of the coal industry. It has been studied for at least a hundred years and has been approached from many viewpoints, academic and technical. The literature of the subject is extensive. The subject has reached a stage, however, where it has become muscle-bound by much repetition. An analysis of the literature reveals the following facts:

1. Heating and combustion undoubtedly are at times spontaneous.
2. Some coals are more liable to spontaneous combustion than others.
3. The same coals with like environmental conditions but in different physical conditions differ in their tendency to burn spontaneously.
4. The same coals in the same physical condition behave differently under different environmental conditions.
5. Coals, in situ, freshly mined or weathered, stored in bulk in the open or under cover, have both heated and ignited spontaneously.
6. Also, wet and dry coals have undergone spontaneous combustion.
7. Coals with and without pyrites have heated and ignited spontaneously.
8. Coals of widely different chemical compositions have spontaneously ignited.

In addition several theories are advanced:

1. The oxidation of pyrites in coal was held until past the middle of the last century to be responsible for spontaneous combustion. It has been observed, however, that coal free from pyrites also has ignited spontaneously. Indeed, laboratory experiments have shown that the pyritic content is almost unchanged even after coal has undergone spontaneous combustion.

2. The theory now held is that the slow oxidation of

the coal substance itself together with the absorption* of oxygen gradually brings the temperature up to the ignition point. The pyrites is thought to play only an extremely small role, if any.

3. The effect of moisture is a question on which there has been much discussion and difference of opinion. Experiments show that some coals oxidize faster when wet, and others oxidize faster when dry. Most people who use and store large quantities of coal are of the opinion, however, that moisture promotes spontaneous combustion.

All the theories that have been advanced postulate that coal must be in a finely divided state. Anything then that reduces the size of the coal particle is responsible in part for spontaneous combustion. Likewise it follows that any chemical or physical reaction which gives off heat is partly responsible for spontaneous combustion.

A heat-producing factor which has been neglected until recently is the adsorption* of carbon dioxide by coal. It has long been known that coal adsorbs carbon dioxide, for its solubility has been measured.† Indeed carbon dioxide is seven times as soluble in coal as in water. The significance of this behavior seems to have been overlooked until the writers investigated this phenomenon‡ as a possible cause of spontaneous ignition of coal.

On passing carbon dioxide through a mass of pulverized coal the elevation of temperature was considerable. In one experiment a kilogram of pulverized coal was

*Attention should be called to the meaning we will attach to the terms "adsorption" and "absorption." Adsorption precedes absorption. The contact of a gas with a solid under suitable conditions results in two processes: (1) An immediate surface condensation called adsorption; (2) a slow diffusion into the interior of the solid commonly called "absorption." It is the energy of the adsorption which produces appreciable heat.

†T. F. Winmill. "The Absorption of Oxygen by Coal," Transactions, Institution of Mining Engineers, Great Britain, Vol. XCVI, 1913, p. 563.

‡Eric Sinkinson and Homer G. Turner, "Adsorption of Carbon Dioxide by Coal," *Industrial and Engineering Chemistry*, Vol. 18, No. 6, June, 1926, p. 602.

The headpiece shows two storage piles, one at a public utility in New Jersey. It would be possible and profitable to store more coal and so further stabilize the industry if a way could be found to prevent spontaneous combustion.

placed in a 3-liter bottle fitted with a stopper. Through the stopper was fitted a delivery tube dipping under the surface of the coal along with a thermocouple imbedded in the coal to measure any changes of temperature.

On passing a rapid stream of carbon dioxide into the cold mass a rise of 3 deg. C. in temperature was immediately perceptible. After stirring the mass by means of the sheath containing the thermocouple a further rise of 4 deg. C. took place. When the mass was sufficiently stirred to become homogeneous it was found to have risen 7 deg. C. in 15 min. Assuming the average specific heat of coal as 0.35, one kilogram of coal would have a water equivalent of 350 grams. This gives 350×7 or 2,450 gram calories per kilogram of coal. It does not take into consideration however the quantity of heat carried away by the carbon dioxide leaving the apparatus, because this could not be conveniently measured.

Following this, a series of experiments was made in which the quantities of carbon dioxide actually absorbed by various coals were measured and the subsequent rises of temperature recorded. Reference will be made only to the most important of these; for the complete series can be found in the June number of the *Journal of Industrial and Engineering Chemistry*, 1926, where are embodied the experimental details.

In these experiments small quantities of pulverized coal were placed in a flask from which the air was exhausted by means of a mechanical pump. The various gases used were then admitted to the flask and their temperature effects recorded by a thermocouple connected with a recording potentiometer. At the same time the quantity of gas adsorbed was measured by a eudiometer.

With coal ground to pass an 80-mesh sieve the maximum temperature rises of 10-gram samples of various coals in contact with carbon dioxide saturated with water vapor are given in Table I.

It will be seen from that table that the highest temperature rises are obtained from anthracite coal. Other things being equal, it would seem from this that anthracite is more liable to spontaneous combustion than any other coals. Anthracite, however, has a much higher ignition point than other coals and does not yield through breakage the large quantity of fine coal that the softer fuels do. For these reasons anthracite is not so liable to ignite spontaneously.

Carbon dioxide saturated with moisture gives greater temperature rises than dry carbon dioxide. For instance a 30-gram sample of anthracite gives a tem-

Table I—Rises in Temperature Caused by Adsorption of Carbon Dioxide

Ten-gram Samples	Temperature Rise, Deg. C.
Charcoal	4.5
Anthracite	4.8
Natural charcoal from anthracite	3.0
Bituminous coal	1.5
Cannel	1.0
Natural charcoal from bituminous coal	0.9

Table II—Effect of Pressure on Adsorption of Carbon Dioxide

Pressure	Temperature Rise, Deg. C.
Full vacuum	5.25
Half vacuum	4.75
One-quarter vacuum	1.75

Table III—Effect of Mixture on Adsorption of Carbon Dioxide

Gas	Temperature Rise, Deg. C.
100 per cent CO ₂	6.72
100 per cent O ₂	1.00
50 per cent CO ₂	3.60
25 per cent CO ₂	2.80
10 per cent CO ₂	2.00
5 per cent CO ₂	2.00

perature rise of 7.7 deg. C. with dry carbon dioxide and 11.65 deg. with saturated carbon dioxide. From this it is seen that water is a distinct factor in spontaneous combustion.

Experiments were tried changing the degree of evacuation of the flask. The results are shown in Table II.

The results as set forth in that table suggest a cause why coal often takes fire spontaneously following a storm. The low atmospheric pressure during a storm would activate coal somewhat as pumping does in the experiments and the return to normal pressure would result in a rapid adsorption and a rise in temperature. Additional moisture would also promote a rise in temperature during a storm period for experiments demonstrate that moist gas is more active than dry.

Using oxygen in the same manner as carbon dioxide it is found that little oxygen is adsorbed with scarcely any rise in temperature. From this consideration it would seem that the adsorption of carbon

dioxide is a more potent factor in the production of heat than is the adsorption of oxygen.

A series of tests was made using mixtures of carbon dioxide and oxygen to see what the selective adsorption effect would be. The results are shown in Table III.

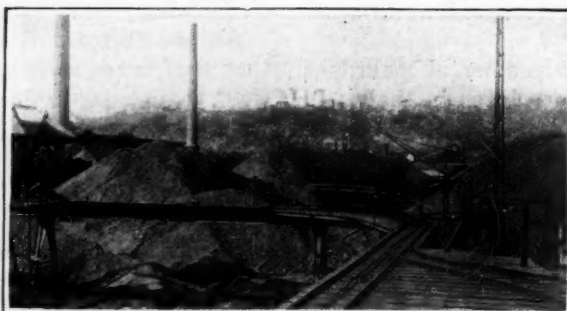
This table shows that adsorption is proportional to the partial pressure of the carbon dioxide in a gaseous mixture and confirms the well-known fact that the most easily liquefiable gas is most readily absorbed by porous substances. In other words the carbon dioxide produces its quota of heat irrespective of the quantity of other gases mixed with it.

In order to determine whether there is a difference in activity between freshly mined samples and stale ones, a sample of anthracite was collected in half-inch lumps in the mine and sealed in bottles filled to capacity. This sample was compared to a sample of old coal from the same bed.

Higher temperatures were obtained from the fresh material.

To confirm the above results samples of coal were placed in the flask which was evacuated by pumping and subsequently subjected to the action of oxygen, then repumped and carbon dioxide admitted. The results were compared with those obtained by the direct addition of carbon dioxide to the same coal after evacuating. In each case, the coal which had first been subjected to the action of oxygen showed slightly lower elevations of temperature.

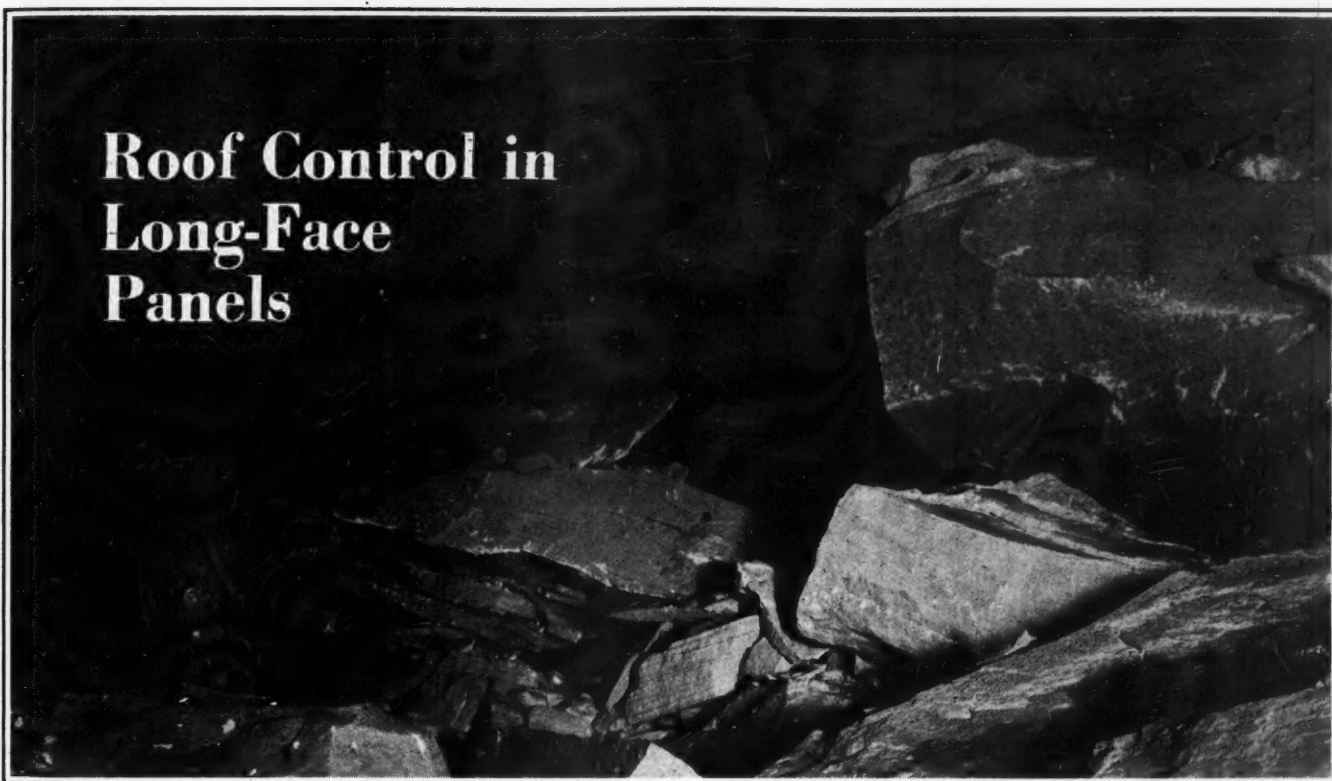
It would appear from the experiments briefly set forth in this paper that the adsorption of carbon dioxide by coal is an important factor in the production of the initial temperatures necessary for its spontaneous combustion.



Storing Coal in Close Quarters

Where coal is spread in shallow piles over acres it is easily handled if it catches fire and is less likely to become ignited. Where space is limited and timber structures block the way and add to the destruction if a fire occurs, the problem is made more difficult.

Roof Control in Long-Face Panels



With Stepped Faces a Long-Face Is Practically a Bord-and-Pillar Operation—Roof Action Controlled by Choice of Gob-Line Angle—Maximum Load on Timber May Be Accompanied by Minimum on Face

By H. F. McCullough

Engineer, H. C. Frick Coke Co., Scottdale, Pa.

NO SOONER was an attempt made to introduce mechanical loading into coal mines than it was apparent that with room-and-pillar methods such serious limitations were imposed on operation that the machines could not be expected to achieve their full possibilities. Many loading machines have already been developed to such a degree of perfection that they may be pronounced mechanically satisfactory, but the handicaps inherent to room-and-pillar workings still prevent their effective operation.

The productivity of a machine is fixed by the proportion of the shift during which it can be kept busy. With the room-and-pillar method of mining, each face provides only a small quantity of coal per cut. Consequently, the loading machine must be moved frequently from face to face, thus reducing correspondingly the time available for productive work. This time is still further shortened by the necessarily intermittent car supply.

Abstract of paper entitled "Elements of Roof Control" presented before the Annual Convention of Coal Operating Officials held under the auspices of the American Mining Congress, at Cincinnati, Ohio, May 24-28, 1926. The headpiece is from a picture taken of a roof-fall in Mine No. 9, West Side, Filbert, W. Va., one of the Pocahontas properties of the United States Coal & Coke Co.

These difficulties led to the belief that long-face and longwall systems would offer a solution of the major troubles. The long face would afford a large quantity of coal in one locality; consequently the loading machine might be productively employed for a larger proportion

of the entire shift. As conveyors could be employed to carry the coal from the loader to a point where a trip of cars could be filled successively without uncoupling, the problem of affording continuous transportation of the coal from the machine was solved with facility.

Unfortunately those who introduced the so-called longwall operations without gob packing generally found difficulty in controlling the roof and in keeping a space open along the face sufficiently wide to permit the loading machines to operate. These difficulties led operators to arrange their workings in a series of relatively short faces stepped in relation to each other.

This system of working in steps made the face advance more rapidly, improved working conditions and concentrated mining operations. A face of the same aggregate length as that of the series of short faces did not give these advantages in nearly the same degree. This series of relatively short faces has come

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to be termed a long-face working. Yet it is not so new as it seems. So far as the principles of roof control are concerned, it is nothing more or less than the old bord-and-pillar working, the first or development work of which consisted of driving relatively narrow roadways, or bords, in the coal at relatively wide centers, dividing the bord or panel into a number of long pillars. The productive working that followed consisted of drawing back these long pillars on their ends, or butts, by some method of long-face working in steps.

PRINCIPLES UNDERSTOOD YEARS AGO

It has long been recognized that this bord-and-pillar system affords a means of controlling a wide range of roof and face conditions. Its principles have been fully developed and were well understood when this method of working was more generally employed than it is today. A study of these principles, therefore, will be extremely helpful in developing a mining system with long-face workings in which mechanical loading equipment is used.

The difficulties heretofore experienced with bord-and-pillar workings arose from the slow progress with which coal was removed by hand mining. The much speedier advance of the working face attainable with mechanical operation permits the coal to be removed from a properly arranged working before many of the difficulties formerly encountered have had time to make themselves manifest.

In a long-face operation success will only be obtained if the break-line of the working panel is sufficiently long to cause the overlying strata to subside or cave, so as to relieve the coal, adjacent to the area of extraction, from the load of the strata above that area. If the pressure on the adjacent standing area is not sufficiently relieved until the overburden has been broken through to the surface, the break line should be made long enough to permit of such a fracture, but if the load is sufficiently lessened before this break has progressed entirely to the surface the break line need not be made so long.

The second requirement is that the working faces shall advance so fast that the roof, coal and floor adjacent to them shall not have time to be broken and weakened. The faster the working faces advance, the shorter is the time that mining operations occupy any particular area and the less the forces acting on roof, coal and floor are able to manifest themselves. In some cases the working may be too rapid—in bumpy coal for example—but generally speaking a rapid advance of the working face tends to transfer the seat of the trouble backward into the gob.

The problem of successful mechanical loading resolves itself into one of controlling at the working face the effect of pressure on coal bed, floor and roof. In any case, with a given rate of face advance, whether in bord-and-pillar or in long-face mining, the roof pressure and its distribution can be largely influenced by the proportions and arrangement of the workings. Hence, the third requirement is that working faces be

so arranged as to minimize or control the pressure exerted upon the coal face, timbering and headings in the region of the active workings.

The stepped face characteristic of bord-and-pillar and long-face workings makes it possible to keep open sufficient space along the working faces for the operation of mechanical loading and conveying equipment. It also facilitates the control of conditions at these faces.

The accompanying illustration shows a long-face panel in which the faces are stepped in relation to each other. The sides and the ends or faces of the pillars form the boundary line between the gob and coal, and this zigzag or stepped line may be described as the "actual" course of the gob line. The general trend of the faces, however, is indicated by the line *G-G* drawn through the middle points of the pillar ends or faces, and this will hereafter be designated as the "gob line." As the pillars are drawn back by successive slices from their ends, the main body of the strata overhanging them tends to break off along the line *B-B* paralleling the gob line but located farther back toward the worked-out area.

In general, it is only after the first major roof falls have occurred that the full "weight" or pressure caused by the overburden is exerted upon the coal. Thereafter that part of the strata overhanging the faces and extending back over the coal for some distance acts as a lever, which, under the influence of its own weight, tends to bend downward and thus exerts a pressure upon the coal underlying it. This pressure is manifested by its crushing, not only the coal face, but also the coal in pillars for a somewhat definite distance back, as for

example, to the line *A-A*. It is greatest at the face and becomes zero at the line indicated.

This subsiding ledge of overlying strata is thus supported only by the ends of the coal pillars, which resist its downward movement. If the pillar ends were worked off diagonally along the line *C-C*, the result would be a single face characteristic of a true longwall working. This, so far as the control of face conditions is concerned, represents the arrangement that has characterized most of the so-called longwall operations that have been attempted with mechanical loaders. It is equivalent to an attempt to work longwall without the construction of pack walls.

STRAIGHT FACE DEPENDS ON PACKING

In projecting workings along these lines it is not generally appreciated that the maintenance of the long straight face is largely dependent upon having gob packing to control the roof and to keep an open space along the face. Most attempts to work longwall without packing are in reality efforts to work by this system without means of control which render its operation possible. The break line is thus made coincident with the working face instead of being kept back in the gob. For this reason the space required in front of the face cannot be kept open.

In the long-face or bord-and-pillar method of working,

CONDITIONS favoring successful long-face operation: Face must be long enough to cause surface subsidence or break, must advance fast enough that roof, coal and floor near face will not be broken or weakened and must be so arranged as to minimize or control pressure exerted on coal, timbering and headings near point of extraction. Slow progress in hand operation is the reason why so much trouble has been experienced with bord-and-pillar mining. Loading machines and conveyors will make speed that will greatly aid success. The rapidity with which the coal is removed enable the miners to leave most of their troubles behind them.

the ends of the pillars are so maintained that their corners project outward from the line *C-C* toward and into the gob. These projections act as "buttresses*" to support that portion of the overhanging ledge of roof strata that lies between the lines *B-B* and *C-C*. This tends to cause the breakline in the roof to form along the line *B-B*, instead of at *C-C* as it would if the face were straight. By this arrangement the space along the working face is ahead of the break line and under uncaved roof. It may consequently be kept open without undue expense.

It is these "buttresses"* of coal and their action in maintaining the integrity of the roof strata between them which renders the long-face or bord-and-pillar method of working adaptable for use with mechanical loaders under conditions such as would make the operation of the longwall face with unpacked gob areas impracticable.

It is generally believed that the end thrust due to the horizontal pressure in the strata sustains in part the weight of the overburden, and, in most cases, it is only after the first major falls have occurred that the full "weight" of roof pressure is exerted upon the coal. It is this pressure and the lever-like action of the overlying strata which crushes the coal at the working faces.

The total pressure exerted by the overhanging strata at the working face, insofar as its manifestation is concerned, may be considered as consisting of three components, namely, the pressure exerted upon the coal at the working face, called the "face component," that exerted upon the timbering along the face called the "timber component" and the pressure encountered in the maintenance of the headings leading to the working faces, called "heading component."

In any instance the intensity of pressure may be gaged by the distance perpendicular to the gob line to which crushing of the coal extends. This pressure is spread over an area as wide as the distance just defined and as long as the gob line.

PRESSURE VARIES WITH SECANT OF GOB ANGLE

Hence in any given working panel where the width of the panel and the total length of working faces are equal the area subject to the pressure and hence the total pressure exerted varies as the length of the gob line and therefore as the secant of the angle of that line, that is, the angle between the gob line and the faces. This angle is marked *g* in the accompanying line drawing.

The term "gob line" will not be held here, or in what may follow, to refer to the actual gob line that zigzags along the working faces with their many large or small steps. It refers rather to the straight line marking the general trend of the division between gob and coal.

The angle of the gob line regulates the pressure which acts upon the coal faces in the process of their removal. It influences the pressure thrown upon the timber along the working face and upon the extremities

of the headings. It affects not only the relation between the several pressure components but also determines their total and the degree of effectiveness with which the coal is broken down and the timber crushed.

CAN JUGGLE LOAD BY CHANGING GOB LINE

A knowledge of the influence of the gob-line angle upon the various pressure components and their distribution enables us in large measure to regulate them. With any given variation of this angle the pressure component will not vary in the same way. Consequently, it is usually necessary, after determining the effect of variations in the gob-line angle on the various pressure components, to decide what value for this angle will give the best combination.

The face component is effective in so far as it breaks down or crushes the coal upon which it acts. Its effectiveness is inversely proportional to the degree to which the coal resists crushing. The ability of the coal to resist pressure is a maximum or minimum according as the line of pressure intensity is parallel, or at right angles, to the direction of its principal lines of cleavage.

The line of pressure intensity, being at right angles to the gob line, is determined by the direction of this latter line and hence by the gob-line angle.

The total effect of the pressure, or the total disturbance caused by it, is influenced by the angle of the line of pressure intensity *e*, which regulates the effectiveness of the pressure, as well as by the angle of the gob line which determines the area over which the pressure is exerted. However, seeing that the angle of the line of pressure intensity is governed by the gob-line angle, the influence of the

latter on the crushing or disturbance of the coal, and hence on the fracturing of the roof, is twofold. Furthermore, the influence of the gob-line angle on the total disturbance may vary with the rapidity of a geometrical progression.

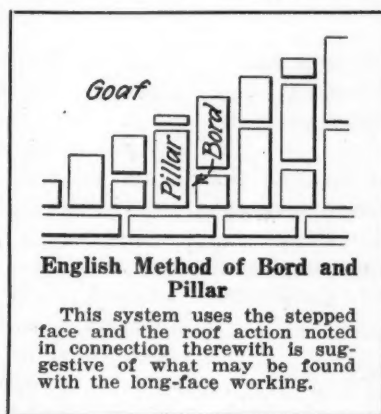
It is possible to modify the face component so as to insure the best results. If entire dependence is placed on blasting for bringing down the coal at the face, this pressure should be as small as practicable. If the subsidence of the roof is to aid in bringing down the coal, it should be regulated so as to make the roof pressure neither too great nor too small.

The gob-line angle regulates the total pressure, and the angle *e* of the line of pressure intensity governs its effectiveness. The gob-line angle however is also a factor in the distribution of the total pressure components.

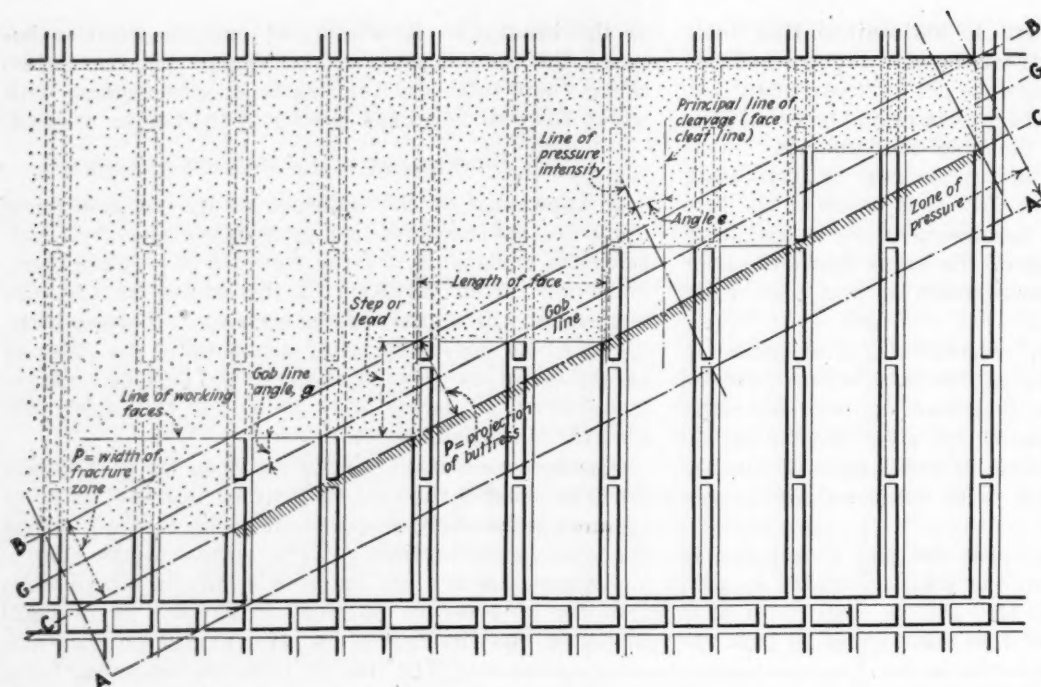
FACE COMPONENT INCREASES WITH ANGLE

Practical experience has demonstrated that, other things being equal, the face component exerted upon the coal at the working faces increases with the gob-line angle. The influence of this angle on the face component arises from its influence upon the shape or proportions of the "actual course" of the gob line, which practically coincides with the edge of the coal, in that according as the gob-line angle is greater or less so will the actual gob line be more or less zigzagged.

The actual course of the gob line approaches a straight line as the gob-line angle approaches zero. The first effect of the straighter actual gob line is that



*The author evidently does not use the word "buttress" to express the purpose of the outlying edges of coal but to indicate in a degree their relative location to the wall. A buttress is not, at least primarily, intended to take weight but to resist thrust or any tendency to overturn. It is occasionally used, as it is here, to designate a projecting support.—Editor.



Long-Face Workings

Faces arranged en echelon give a diagonal break line with projecting corners of coal that perform the same function as the packs carried behind the face in longwall operations. The weight of the overlying strata in any case must be taken by coal, as no timbering or any substitute therefor can possibly sustain the enormous pressures encountered. The roof in reality fractures at some point behind the coal face, and the object of the timbering is to hold up the fragments until the face can be worked out and another cut made. The gob-line angle offers a ready means of varying or adjusting the roof pressure to the amount desired.

the rock falls more rapidly and cleanly. It is a matter of practical observation that the "cleanness" and rapidity of the break-off reach their maximum when the line upon which it occurs becomes straight.

The cleaner and more rapid the fall of the roof the less is the leverage of the unbroken overburden on the working face and consequently the greater the degree of relief from pressure on the coal. The face component thus becomes less, or its maximum value is manifested for the minimum length of time.

SOMETIMES WANT MORE WEIGHT

In true longwall (that is, with bending-roof action) the value of the face component on the coal faces is frequently too small. In bord-and-pillar work (that is, with a caving-roof action) on the other hand, this pressure is frequently much larger than is either necessary or desirable—so much larger, indeed, that the mine cannot be operated economically unless the pressure is decreased.

The chief reason for this difference is that, in longwall, the gob line is straight. Consequently, the roof strata usually break more cleanly at the face, thus relieving the pressure upon it. On the other hand, where, as in bord-and-pillar, the gob edge is composed of many angles, the break is not so clean, and the pressure, consequently, is increased.

BUTTRESSES REPLACE PACKWALLS

In a bord-and-pillar working with its stepped face, the protruding pillar corners constitute in effect outstanding "buttresses" projecting into the gob. These take the roof pressure in the same manner as do the packwalls built in true longwall mining, the object of which is to project the pressure forward onto the coal at the face.

In true longwall, the stone packs transmit pressure to the coal. They act as a resistance sufficient to prevent the roof strata from breaking off at the face, yet insufficient to preclude bending. It is this flexure of the strata that creates the leverage by which the pressure is transmitted from the gob to the coal face.

In both bord-and-pillar and long-face systems,

resisting "buttresses" are present. These possess large resistance but not as much as solid coal. The resistance of the buttress at its point is practically nil, but increases as the sides diverge. Hence the crushing effect upon the coal is greatest at the point and decreases toward the solid.

The length of the individual faces and the distance one leads the other being constant, all the re-entrant angular points of the gob edge will lie along a straight line as C-C in the accompanying illustration. This will be parallel to the gob line. Similarly all the salient angular points of the coal edge lie along another straight line such as B-B, also parallel to the gob line.

The area between these parallel bounding lines is called the "fracture zone." All the weight exerted by the roof strata over the whole of the fracture zone is sustained solely by the triangular "buttresses" of coal, whose aggregate area under all conditions equals half that of the fracture zone.

BUTTRESS POINTS UNDER HEAVY LOAD

The degree to which the projecting "buttresses" of coal resist the downward movement of the roof strata controls the effect of the roof pressure, which pressure is met by a resistance that steadily increases from the outer to the inner margin of the fracture zone along a line perpendicular to the gob line. At one extremity of this line only the points of the coal pillars resist the pressure whereas at the other it is the solid bed of coal.

As less resistance to downward movement is offered by the points of the coal "buttresses" than by their bases, the roof strata will naturally deflect or descend a greater distance in the region of the points than at the solid coal. The ratio of the deflection of the overlying strata to the distance or span over which it takes place constitutes a measure of the stresses induced in the strata and consequently of their tendency to fracture.

In bord-and-pillar mining the critical deflection of the overlying strata is that which occurs within the limits of the fracture zone. The relative amount of deflection constitutes a measure of the stress and hence of the

tendency to break. With a given roof pressure, it is evident that the wider the fracture zone the less is the rate of downward deflection or that per unit of length taken perpendicularly across the critical zone. It is also evident that the width of the fracture zone is controlled by the length of the unit faces and the angle of the gob line.

Downward deflection of the overburden induces a vertical stressing or beam action in the roof strata which tends to cause their failure through tension in the upper layers. Strains induced in the overburden and consequently the tendency for the strata in the fracture zone to break and fall is found to be extremely sensitive to changes in the length of the faces and the angle of the gob line.

Consider a panel of workings with a given face length and fixed gob-line angle. If the length of face is doubled, and the gob-line angle is constant the strain in the overlying strata will be quartered. Furthermore, if the gob-line angle be increased so that its sine is doubled, the strain will be again quartered, or its final value will be one-sixteenth of its former value.

Conversely, if the length of the face be halved, keeping the gob-line angle constant, the strain on the overlying strata will be quadrupled. If this angle is so reduced that its sine is halved, the strain will be quadrupled, or its final value will be sixteen times as much as it was originally.

These facts clearly indicate how important is the angle of the gob-line, the length of the faces and the width of the pillar. These factors are of primary importance in bord-and-pillar and long-face work, because on them depends the degree of strain or displacement of the roof and the consequent tendency of the strata above the fracture zone to break and fall on the working faces.

DISTRIBUTION VS. INTENSITY

Much depends upon the distribution of the stress as well as upon its magnitude. With a given width of fracture zone, the greater the strain, the greater the rate of change of the stresses in the strata overlying it and hence the tendency for the roof to break. With a given strain the less the width of the fracture zone, the greater is the rate of change of these stresses.

Where these stresses change in a short distance from maximum to zero as measured at right angles to the gob-line a greater strain is brought on the roof strata. This is an important practical consideration for it in turn increases the liability of these strata to break rather than to bend. If the strata break a greater load is thrown onto the projecting buttresses of coal and the face is more severely crushed, causing the strata in the fracture zone to fall on the faces.

Thus the gob-line angle and the length of the unit faces are the natural and effective means of regulating the face component. An intimate acquaintance with the functions and influence of this angle will suggest many ways of adapting it to the conditions encountered.

Careful distinction should be made between the timber component which is more particularly exerted upon the face timbering, and the face component already

considered. The timbering along the working face steps into the vacant space resulting from the removal of the coal. In one sense it is subjected to the pressure formerly exerted upon the coal, the site of which it now occupies. It does not, however, in any sense intercept the face component, for no timber and practically no substitute therefor is capable of effectively resisting the enormous pressure encountered.

SHOULD YIELD RATHER THAN RESIST

As a matter of fact, the efficiency of face timbering, or any substitute for it, depends upon its ability to yield to the face component rather than to resist it. Its efficiency thus depends chiefly upon its elasticity. Whatever may be the value of the gob-line angle, there will always be a downward movement that no timber or timber substitute can effectively resist. But, as the timber gives way, the pressure it carries is only that which is sufficient to make it yield to the roof movement, which the crushing of the coal permits.

The face component is exerted upon the coal and is resisted by it, but this resistance is not, in the absolute sense of the word, effectual. Although the coal offers a continual resistance to this pressure, the roof strata gradually descend.

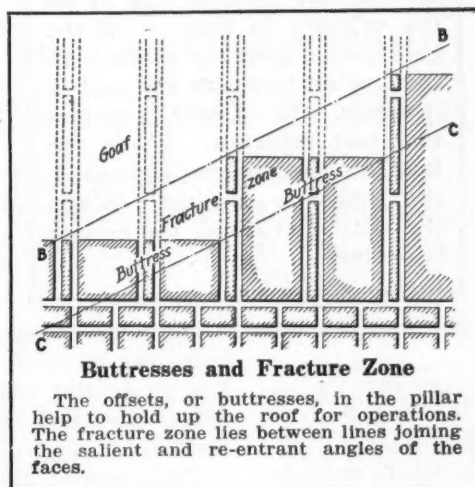
To a limited extent the face component may influence the consumption of face timber, but the destruction of these roof supports is a process requiring time. As the roof strata descend slowly, the pressure will first tighten a newly set timber, then drive it into the cap or bottom piece, then bend and finally break it. If this descent is comparatively slow, the face of

coal may be entirely worked out and all the timber withdrawn before the face component has destroyed a single stick. If it be more rapid the timber on a slow moving face may have to be replaced several times.

One result of the descent of the roof strata within the fracture zone is that pieces of the roof gradually fracture. Fragments become loosened or detached and, if unsupported by artificial means, come down. The only object of the face timbering is to intercept the possible fall of such fragments, but the face component, except, in so far as it may be relieved by the loosening of these pieces, is still sustained by the coal yet unworked.

It has been frequently observed that, after a face of coal has been worked out, all the timber behind it may be driven into or even completely through the cap or bottom pieces, yet upon its withdrawal the roof does not fall. In some cases, every stick of timber in the place may be broken, yet the roof will not come down, because the pressure is sustained by the coal yet unworked. The descent of the roof is thus not arrested by the timber, neither is its downward movement appreciably facilitated by timber removal.

Loading and destruction of the timber in the working places is governed not so much by the actual magnitude of the face component as by the rate of the roof descent. Thus the timber component is a pressure arising from the velocity of descent rather than from the magnitude of the face component.



The average stress on the "buttresses" of coal is always practically double that on the unworked bed. The greater the area of the buttresses the less the liability of these strata to fracture, and hence the greater the likelihood of the stress being partially transmitted to the unaffected strata over the solid coal. The greater the area of the buttresses, the more evenly distributed are the strains in the overlying strata; the more pronounced is the bending strain as opposed to the breaking strain, in the roof and hence the velocity of descent is less. Thus the magnitude of the face component decreases as the shearing stress in the strata becomes greater and rises as the horizontal tension is transmitted over a larger area.

The narrower the fracture zone, and hence the smaller the face component, the greater the rate of change of the stresses in the roof strata. The smaller the face component, the more rapid is the break-up in the overlying measures. The weight of the fragments thus formed comes solely upon the timber and constitutes the very essence of the timber component. When the face component is greatest, the least severe conditions are imposed on the face timbering, for the descent of the roof is then the slowest, the timber is exposed to the pressure for the shortest possible time and the less the overlying strata are broken.

A large proportion of the effective pressure on the face timbering arises from a factor the magnitude of which is in inverse proportion to that of the face component. This is the ability of the roof strata to break off quickly and cleanly at the gob-line. With small gob-line angles the face component is comparatively small because the approximately straight gob-line, being comparatively free from projecting buttresses of coal, facilitates the rapid and clean fracture of the roof strata and so reduces the leverage exerted upon the coal.

BREAKS BACK OF COAL

There are really two break lines that must be taken into account in connection with the timber component. One is the gob-line proper (B-B in the accompanying illustration) at which the strata have already broken off. Though the break line proper lies gobward of any given cut still working, a new break line approximately along the solid face (line C-C) is in process of formation. This, being parallel to and a duplicate of the real existing break line, possesses the same general properties as its parallel counterpart.

Hence, in common with the real break line, this embryo fracture line possesses the property of more or less effectively facilitating, the clean and rapid break of the overlying strata. The point to be noted is that on each working face under way, the timbering occupies a position practically between the two parallel break lines.

When the gob-line angle is a minimum, the total pressure and the face component are at their respective minima, for the gob proper has already broken off and the leverage is the least. But, in the same case, the working face under way, or that part from which the

coal has been removed, becomes, practically, just so much new gob. In this new gob area, that is, within the fracture zone, the face timbering is placed.

The clean and rapid fracture of the roof at this new break line in process of formation will be facilitated by the same factors that governed the previous fracture at existing break line. The angle g being a minimum, the rapidity of the breaking-off process will be a maximum. Consequently, the maximum weight of fragmentary strata will descend with the maximum rapidity.

Thus the speed of the fracturing process which reduces the magnitude of the face component affects the timber component in an opposite manner. The coal on the face next to be worked is thus relieved of pressure with the greatest rapidity, but this relief is effected wholly at the expense of the timbering along the working face yet under way.

The timber component is chiefly due to the actually fractured (not merely bent) strata contained between the break lines in the fracture zone and its total amount is the aggregate weight of the detached fragments, for the weight of these pieces if held up at all must be sustained by the timbering. This weight increases with a rapidity proportional to the general break-off at the fracture line.

The timber component, if stated in pounds per square inch, may be small compared with the face component, but its greater efficiency as a destroyer of timbering lies in the fact that the velocity of descent of the fragment is limited only by the resistance of the timber.

The areas of the headings in a working which is subject to the pressure of the overhanging strata is proportional to the area over which this pressure is exerted. This is because the areas of the headings bear a fixed relation to that of the panel and the only parts of the headings affected are those embraced within the region over which this pressure is manifest.

As this area is proportional to the length of the gob-line, the area of the headings subject to the pressure is proportional to the secant of the gob-line angle. Hence, the smaller this angle the less the area of headings to be maintained against the disturbance created by the pressure.

No general answer or one that will apply in every case can be given to the question: What is the proper value of the gob-line angle? but knowledge of the influence of this angle will permit its manipulation in such a way as to cope with local conditions and meet the necessities of any particular case. Within limits it is possible to obtain certain desired effects and avoid others, but it will generally be found that the matter resolves itself into one of give and take.

Except a regards extremely shallow mines, it is almost safe to say that this angle should be the smallest possible. In operations of considerable depth, no matter how small this angle may be it is usually found that the face component is as great as is desired—too often it is sufficient to crush the coal and cause the roof strata within the fracture zone to break and fall. The practicable minimum is reached when one face leads the one behind it by the depth of one cut.

THE ANGLE of the gob line regulates the total pressure. If it is quite oblique to the "treads" of the steps in the stepped face, then the total pressure on the face is greater because the roof does not break off so clean. The pressures on mine posts depend not so much on the load on the face as on the velocity of descent of the roof under bending stress. In fact, when pressure on coal is heaviest, the timber receives the least pressure. When the load on the coal is lightened, the timber is crushed. When the coal is crushed, the timber is protected.



In Thin-Seam Mine, Loading Machine Handles Rock Five Times as Fast as Hand Loaders

Though Substantial Savings Are Made by Machine Its Assistance in Speeding Mine Development Is Even More Important — Top Is Taken for Height and Bottom Lifted Only Where Rolls Make Grading Necessary

By A. C. Hohnke

Superintendent, Russell Coal Mining Co.,
Clymer, Pa.

IN THE No. 45 MINE of the Russell Coal Mining Co., subsidiary of Peale, Peacock & Kerr, Inc., two mechanical loaders are taking top and bottom rock at a saving of 25 to 50 per cent over hand-loading methods, depending upon the quantity handled per lineal yard of entry. Of greater value than this saving is that which is indirectly effected through speedier development. Rock is being taken mechanically in about one-fifth the time required for hand-loading.

No. 45 mine is located at Clymer, Indiana County, Pa., and is operating in the "B" or Miller seam, which in thickness averages about 42 in. The coal is clean except for a 4-in. band of bone coal against the roof, which is a laminated shale. The bottom, which lies in rolls, consists of fireclay.

In this mine, workings on the rise are developed by three entries and dip workings by four. All entries are driven 11 ft. wide and in these sufficient top and bottom rock is taken to provide a clearance of 6 ft. above the rail. As bottom lifting is more expensive than top brushing, the bottom is not excavated except where rolls make grading

necessary. Then a comparatively long stretch of top is taken before such grading is attempted.

This mine was opened in the summer of 1923. The management knew in advance that much rockwork would be involved in the operation of this mine. Desiring rapid development it decided to load rock mechanically and therefore installed one Myers-Whaley shovel. A second machine of the same type was installed in February of 1924, on the strength of successful performance of the first. To date these two machines have

taken from the 11-ft. entries 11,000 lin.yd. of top rock, 36 to 50 in. thick, and 2,000 lin.yd. of bottom rock which in thickness varied from a few inches to 9 ft. In no part of the mine has rock been handled by hand.

As the mechanical loading of rock under similar conditions was not a practice in any mine prior to this installation, the management was compelled to

work out its own methods. After much time had been devoted to experimenting the following system was evolved:

In stretches of at least 100 ft. the face of an entry is advanced by hand loading, in which operation coal only is taken. Simultaneously with this operation permanent track is laid. In the rock-taking operation which follows quite a little attention is given to shooting,

Cost of Machine Compared with Hand Loading

Thickness of Rock Taken, Inches	Hand- Loading Cost	Machine- Loading Cost	Saving Effected with Machine	Per Cent Saving
24	\$3.27	\$2.45	\$0.82	25.0
30	4.08	2.82	1.26	30.9
36	4.89	3.09	1.80	36.8
42	5.71	3.26	2.45	42.9
48	6.52	3.40	3.12	49.9

This paper was presented at the Cincinnati meeting of Coal Operating Officials, American Mining Congress.
In the headpiece the machine is removing in an aircourse a 3-ft. fall of fireclay roof. The thickness of the seam is only 38-in. and the additional height saves expense for the operator by reducing the resistance to ventilation.

the purpose being to avoid sledging or mud-capping, as such operations seriously retard progress. Where two shots are fired simultaneously, one on either rib, practically no sledging or mud-capping is necessary, as the rock then is well broken and the entry nicely squared.

As soon as the coal has been loaded out and permanent track laid, a portable compressor is moved into place. The compressor furnishes power to rotary drills equipped with 12-ft. bits, which are used to drive one hole on each rib. Shots are fired simultaneously by a low-voltage battery. After two or more shots have been fired a pile of rock is formed on which the drillers stand while putting in shotholes.

This job is performed sufficiently far enough in advance as not to interfere with the work of machine loading, which follows on its heels to the face. Sometimes coal is taken far enough ahead to supply the machine with a week's work in one heading, and it is never provided with less than a shift's work in any one place. By shoveling over the rail in the manner described no cleanup work back of the machine is necessary, as the fine rock that is left is just sufficient for ballast.

The rock is shot for the entire distance to the face before the machine is moved into the entry. This insures continuous operation of the loading machine, except for delays due to the shifting of cars and to waiting for trips. Under these circumstances an average of eighty 1½-ton mine cars per shift are being loaded consistently. The record for this work at No. 45 mine is 126 cars in 8 hr. During this run cars were loaded at an average rate of 1½ min. and shifted in 2½ min.

A crew is composed of four men, two who drill and shoot, a machine operative and a machine runner's helper. Where the grades are so steep that the regular crew is unable to handle cars efficiently a motorman also is employed.

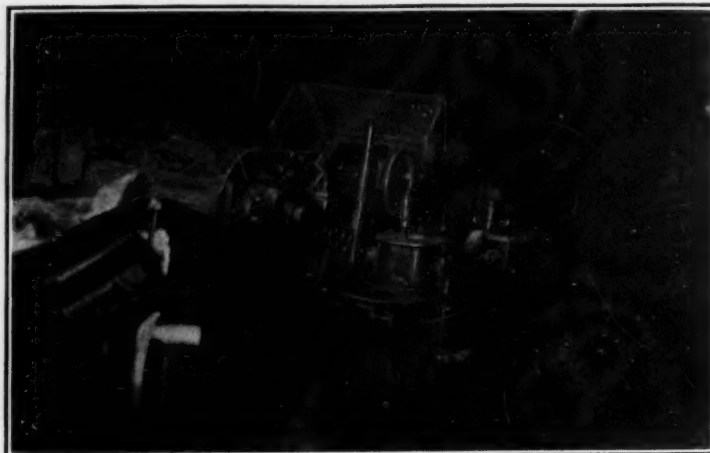
As already mentioned, bottom is taken only for purposes of grading. In this work the machines have proved equally successful in reducing costs and speeding development. The advance in taking bottom is not as rapid as that in taking top, because in the former operation track must be laid with the advance and because the machine sometimes is kept waiting for the drilling and shooting of the bottom. The delay incidental to laying track has been much reduced by the use of 7-ft. built-up rail sections that can be laid in ten minutes. In this case the machine makes its own bottom because the shovel is operated about 8 in. below the top of the rail. A crew for bottom-taking consists of three men who operate the machine, drill, shoot, lay track, shift cars, etc. The average loading under these conditions is about forty cars per 8-hr. shift.

The following cost figures, which reflect the results

of three years' experience with these machines (double-shifted part of the time), should be of interest:

Lubrication, waste, etc., cost 50c. per day or ¼c. per ton; the actual cost for the replacement of parts was 2c. per ton; labor for repairs was ¼c. per ton; consequently the total cost of maintenance and upkeep averaged 2½c. per ton.

As my experience with machines has been in a mine where no yardage scale for taking rock by contract has been established, I am in no position to state the exact saving per yard by the use of these machines; but for the sake of comparison I give herewith the yardage rates in an adjoining mine, where conditions are practically the same, and compare them with machine costs for similar work. In the mine to



Loading a Stretch of Top Rock

For greater economy of operation, the roof is brushed in stretches of 100 ft. and the material therefrom is loaded without interruption during a shift. In this case 3 ft. of top was taken. Note the air line at the upper right corner which supplies air to rotary air drills. These are operated sufficiently in advance as not to interfere with the loading operation.

which reference is made the contract price for taking top rock of 24 in. thickness is \$3.27 per lin.yd., or 13.6c. per in., for entries 11 ft. wide. The costs of hand loading are compared with machine loading in the accompanying table.

The saving in actual cost of brushing with machines although large is often of secondary importance as compared with the indirect saving gained from the speed with which work is accomplished.

As an example of this consider the work involved in the hand-loading of a 11-ft. entry. In a gallery of this width only two men can load efficiently—any more would be in one another's way—and on an average these two men will load together about 24 tons of material per shift. On the other hand, in an entry of similar size the loading machine with a crew consisting of from three to five men, depending on conditions, will load approximately 120 tons per shift and thereby increase tonnage handled and yardage gained about five times.

In my opinion, therefore, the rapid development that can be attained by the use of machines is of even greater value than the direct saving over hand loading. To obtain the full benefit from the use of machines, rock should be properly shot and an efficient system of car shifting devised from experience. In other words, the machine will do the work if it is properly serviced.

Deterioration of Illinois Coal.—S. W. Parr has ascertained that the over-all efficiency of Vermillion County nut coal after six years of storage is 64.2 per cent, of the fresh screenings 63.8 per cent and of Sangamon and Williamson County nut and screenings after six years in storage 63.5 per cent. Apparently storage had a negligible effect on the coal, for the fresh coal gave no better result than the old. Nut coal from Vermillion County lost in six years' storage 4.8 per cent in its thermal value and the screenings 10.1 per cent. Nut from Williamson County lost 3.86 per cent and screenings 3.70 per cent. Nut from Sangamon County lost 5.6 per cent and screenings 6.3 per cent.

Four Coal Fields Operate Almost Exclusively on Water-Generated Central-Station Power

Appalachian Power Co. Supplies Pocahontas, Virginian, Tug River and Clinch Valley Fields—Power Demands and Costs per Ton Decline—Energy Bills Vary from 6.45 to 27.85c. per Ton of Coal Mined

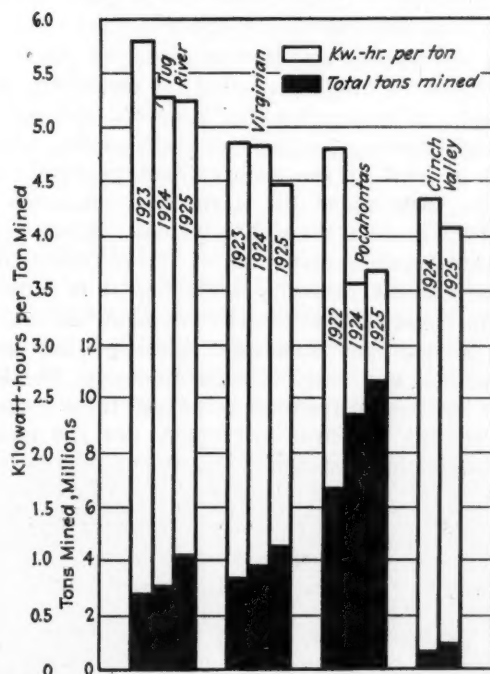
THE APPALACHIAN coal fields of West Virginia and Virginia buy their power almost exclusively from the Appalachian Electric Power Co. which, as the Appalachian Power Co., developed two water-power sites on New River and built a transmission system in 1913. The chief load available in the territory consisted of widely scattered coal mines operated as independent units with local plants that were not modern, efficient or well-operated. They, however, had the advantage of using coal from the mines, the market value of which was only about 90c. a ton. Two of the five fields into which the territory is divided are operated exclusively from the lines of Power company, an-

other gets 97 per cent of its power from the utility company and the fourth 95 per cent.

In 1925 with the aid of central-station power 20,499,638 tons were mined in this region with a total energy consumption of 86,181,962 kw.-hr. Averaged, this gives 4.21 kw.-hr. per ton and a power cost of 8.67c. per ton at an average rate of 2.07c. per kilowatt-hour. The lowest load factor of any of the four fields is 28.5, the

SUMMARY OF 1925 COAL FIELD LOAD OF APPALACHIAN ELECTRIC POWER COMPANY

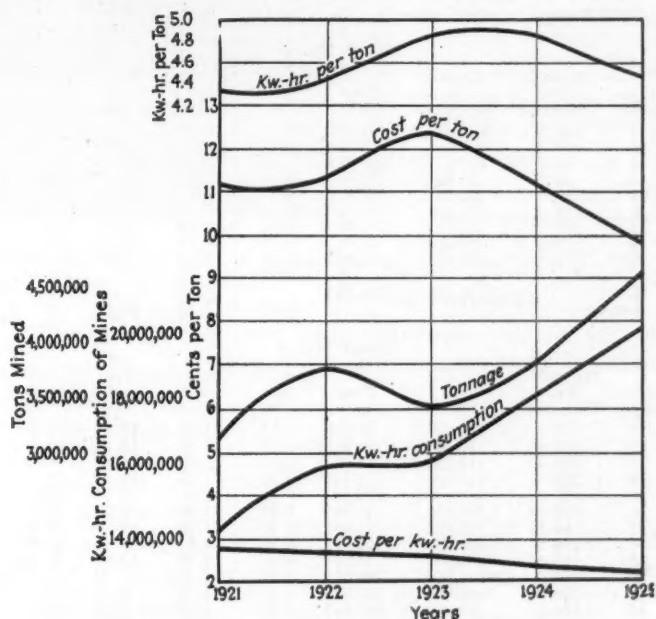
Coal Field	Tons of Coal Loaded	Kw.-Hr. Used	Kw.-Hr. per Ton	Average for Field—		No. of Cos.
				Power Cost per Kw.-Hr. Cents	Power Cost per Ton Cents	
Pocahontas...	10,658,879	39,110,259	3.67	2.13	7.82	29.6
Clinch Valley	940,465	3,830,045	4.07	2.48	10.03	31.5
Tug River...	4,251,260	22,313,519	5.24	1.79	9.36	37.3
Virginian....	4,651,034	20,919,139	4.49	2.19	9.82	28.5
	20,449,638	86,181,962	4.21	2.07	8.67	64



Graph Shows How Electrical Cost per Ton Has Declined at Appalachian Mine Plants

Since 1923, the cost and use of power per ton have declined in the mines served by the Appalachian Power Co. in Virginia and West Virginia. The cost per kilowatt-hour has also steadily declined. The gross tonnage and kilowatt consumption have greatly increased.

Excerpt from article entitled "Coal Mines as Loads" which appeared in *Electrical World*, July 17, 1926.



Kilowatt-Hours Decline but Tonnage Rises

Economies in operation make this remarkable change which is especially marked in the case of the Pocahontas region with its large output.

highest is 37.3. The largest tonnage-producing field has a load factor of 29.6. During that year sixty-four coal companies bought power and, of course, many more mines than companies are being thus serviced as some companies have many plants.

The reasons for buying power, rather than manufacturing it, were that the mine owners desired to keep down their capital charges by eliminating an investment in a power plant, were unable to obtain and retain competent power-station attendants, found utility service more reliable than that of their own plants, wanted to concentrate on coal production and be released from attention to power plants, lacked circulating water for the operation of a modern plant, found their own plants were worn out and out of date and were operated at great expense because of poor boiler and circulating water, found cost of power generated at their own plants too expensive and not able to meet the demands of growing production, discovered that the erection of a central-station involved ultimately the ownership and management of a complex transmission system, noted that during slack periods the carrying

FIGURES SHOWING COST OF PURCHASED POWER PER TON OF COAL MINED IN THE APPALACHIAN COAL FIELDS FOR THE YEAR ENDED DEC. 31, 1925 (BASED ON RAILROAD SHIPMENTS)

Field No. 1							
Customer	Monthly Kw. Demand	Kw.-Hr. Consumption	Tons Loaded	Kw.-Hr. per Ton	Cost per Kw.-Hr., Cents	Cost per Ton	Load Factor, per Cent
1	387.5	1,173,720	245,705	4.79	1.96	9.43	35.1
2	211.5	502,650	158,509	3.17	2.38	7.55	27.5
3	484.3	1,104,596	317,760	3.48	2.21	7.71	26.4
4	61.0	227,639	139,790	1.63	2.30	3.75	43.2
5	299.2	1,332,000	99,465	6.68	1.72	11.45	56.6
6	510.5	1,792,716	499,770	3.60	1.79	6.45	40.6
7	204.6	434,220	115,700	3.75	2.54	9.52	24.6
8	735.75	2,335,629	740,160	3.16	1.86	5.86	36.8
9	103.7	179,780	21,430	8.40	3.10	26.00	20.1
10	642.6	1,690,370	447,030	3.78	2.00	7.58	30.4
11	382.7	1,581,300	454,995	3.48	1.71	5.96	48.0
12	86.3	195,720	69,195	2.83	2.75	7.78	26.3
13	.....	14,840,176	4,589,020	3.24	2.27	7.35	.....
14	135.0	242,200	107,320	2.26	2.91	6.58	20.8
15	67.5	102,910	29,325	3.52	3.61	12.75	17.7
16	737.5	1,004,062	204,160	4.90	2.99	14.68	15.7
17	3,260.0	7,495,919	1,552,780	4.81	1.98	9.56	26.6
18	778.5	1,665,802	418,675	3.99	2.26	9.00	24.8
19	412.9	1,217,850	346,090	3.51	1.98	6.97	34.2
Total	.....	39,119,259	10,656,879	.....	.....	.....	.....
Average	.....	.....	.....	3.67	2.13	7.82	.....

Field No. 2							
Customer	Monthly Kw. Demand	Kw.-Hr. Consumption	Tons Loaded	Kw.-Hr. per Ton	Cost per Kw.-Hr., Cents	Cost per Ton	Load Factor, per Cent
1	226.5	679,500	194,740	3.48	2.31	8.05	34.7
2	109.7	133,764	39,750	3.37	4.15	14.00	14.1
3	136.9	200,025	28,235	7.10	3.59	25.40	17.1
4	20.75	82,920	15,915	5.20	3.13	16.28	45.7
5	230.9	1,302,667	300,775	4.35	1.74	7.56	65.2
6	135.0	178,020	73,715	2.42	3.78	9.28	15.3
7	295.5	552,749	157,455	3.51	2.85	14.00	21.7
8	155.0	419,600	72,965	5.75	2.55	14.65	31.3
9	99.4	281,200	56,905	4.95	2.64	13.05	32.8
Total	.....	3,830,445	940,465	.....	.....	.....	.....
Average	.....	.....	.....	4.07	2.48	10.03	.....

Field No. 3							
Customer	Monthly Kw. Demand	Kw.-Hr. Consumption	Tons Loaded	Kw.-Hr. per Ton	Cost per Kw.-Hr., Cents	Cost per Ton	Load Factor, per Cent
1	177.2	241,800	28,075	8.61	3.25	27.85	15.8
2	277.55	571,800	115,465	4.94	2.48	12.25	23.9
3	265.8	418,220	74,433	5.62	2.93	16.48	18.2
4	260.4	658,080	102,028	6.45	2.22	14.32	29.3
5	127.5	469,600	101,892	4.60	2.07	9.53	42.6
6	659.25	1,766,650	548,360	3.22	1.98	6.39	31.1
7	244.5	627,500	157,034	4.00	2.29	9.19	29.7
8	1,558.6	3,474,226	573,797	6.06	2.05	12.40	25.9
9	185.0	644,900	98,671	6.53	2.00	13.06	40.3
10	452.0	1,051,600	203,327	5.18	2.21	11.42	27.0
11	256.5	646,000	145,925	4.35	2.25	9.98	29.1
12	546.6	1,291,400	350,011	3.69	2.15	7.92	27.4
13	816.7	1,964,000	647,869	3.03	2.05	6.22	27.8
14	351.6	1,080,640	318,209	3.40	1.97	6.71	35.7
15	147.9	220,800	64,305	3.44	3.18	10.90	17.3
16	259.25	733,514	94,734	7.74	2.12	16.41	32.8
17	165.0	387,760	116,309	4.33	2.20	7.34	23.5
18	202.1	255,520	60,747	4.21	3.10	13.01	14.6
19	76.3	71,300	15,160	4.70	4.53	21.00	10.8
20	.....	1,177,459	268,626	4.38	2.22	9.72	.....
21	115.6	85,200	38,512	2.21	5.18	11.48	8.5
22	393.8	690,200	107,652	6.40	2.61	16.70	20.3
23	141.5	228,040	35,750	6.77	3.03	20.60	18.6
24	224.5	630,940	97,285	6.49	2.18	14.16	32.5
25	379.3	1,531,990	288,858	5.31	1.73	9.17	46.8
Total	.....	20,919,139	4,651,034	.....	.....	.....	.....
Average	.....	.....	.....	4.49	2.19	9.82	.....

Field No. 4							
Customer	Monthly Kw. Demand	Kw.-Hr. Consumption	Tons Loaded	Kw.-Hr. per Ton	Cost per Kw.-Hr., Cents	Cost per Ton	Load Factor, per Cent
1	133.0	428,660	78,395	5.46	2.18	11.90	37.3
2	140.0	258,200	52,530	4.91	2.85	14.00	21.3
3	132.0	267,800	51,395	5.20	2.73	14.21	23.6
4	1,110.0	2,731,980	294,000	9.30	1.96	18.21	28.5
5	1,762.0	6,507,437	1,231,815	5.78	1.42	7.51	42.8
6	108.75	319,980	62,705	5.10	2.35	12.05	34.2
7	414.4	931,600	364,195	2.55	2.22	5.68	26.1
8	450.0	1,402,300	301,560	4.65	1.91	8.88	36.1
9	172.8	221,900	32,160	6.90	3.47	24.00	14.9
10	423.5	1,653,895	324,360	5.10	1.74	8.87	45.2
11	198.5	160,500	21,015	7.63	3.20	24.45	9.4
12	156.0	485,915	175,715	2.76	2.17	6.01	36.2
13	71.0	250,360	32,035	7.81	2.25	17.59	40.8
14	.....	110,030	39,505	2.79	2.40	6.70	.....
15	328.0	2,233,750	260,340	8.58	1.45	12.46	78.9
16	1,475.0	493,500	60,505	8.15	2.11	17.25	38.7
17	38.1	34,063	13,720	2.48	4.20	9.96	17.8
18	283.75	1,725,150	343,670	5.02	1.53	7.69	70.2
19	65.5	44,600	9,020	4.94	4.82	23.85	10.5
20	769.7	2,051,899	502,620	4.07	1.97	8.02	31.0
Total	.....	22,313,519	4,251,260	.....	.....	.....	.....
Average	.....	.....	.....	5.24	1.79	9.36	.....

charges of a lightly loaded privately owned system were excessive and that by using the power company's energy they had the advantage of the advice of its engineer in raising their operating standards.

The cost of power with private plants was about 12c. per ton and about 9c. when power was purchased. The owners found that when they bought their power they could recover the cost of their electrical equipment in from two to three years. One company lowered its costs from 14c. to 7c. per ton by changing from its own private plant to central-station power.

The power supply has been found more reliable than that from private plants. On one main line supplying forty-one mines during 1923 the total interruption was only 6 hr. and 30 min. The utility power is taken to its main-line substation at 88,000 volts. There it is stepped down to 13,000 volts for a secondary distribution to mine substations. The utility buys, owns and installs the transformers at the mine substations and meters the energy on the low-tension side. A 3-min. demand meter and a kilowatt-hour meter are generally used but the demand is often estimated as 50 per cent of the connected load.


Mine Surveys Date Back to 1400 B.C.

The earliest known records show surveying to have been first practiced in Egypt, where the Nile overflowed its banks annually, leaving a rich alluvial deposit which fertilized the soil. Land owners were taxed for the area covered by this overflow. This necessitated a series of measurements, which divided the land into triangles, quadrilaterals, and other geometrical figures, from which were calculated the areas of the lots. Land surveying naturally preceded mine surveying by many years. The oldest mine map known is now in the museum at Turin. It shows the workings of an Egyptian gold mine and was drawn about the year 1400 B.C.

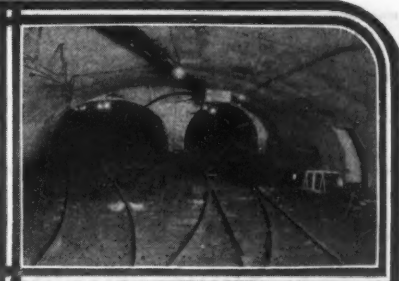
As far as records go, it was Hero, of Alexandria, who developed the first instrument for measuring angles in the field. It was called the "dioptr" and consisted of two bars fastened together at right angles, and supported by a staff at the point of intersection. From this crude instrument of Hero, the centuries have developed the modern theodolite transit. When one considers the marvelous structure of the pyramid Ghizeh, in Egypt, with its perfect orientation, it is difficult to believe its construction possible without the aid of a scientific instrument somewhat akin to the modern theodolite. In any case, if such did exist, the knowledge of it has passed from mankind and Hero is credited with developing the first instrument for the measurement of angles in the field.

From an article entitled "Mine Surveys and Plans" by Alexander L. Fay, assistant mining engineer, Dominion Coal Co., presented at the annual meeting of the Mining Society of Nova Scotia, Canadian Institute of Mining and Metallurgy.

AMERICA HAS OFTEN BEEN charged with being a wasteful nation. The statement has often been made that a peasant of Europe could live on what an American wastes. It is not waste, however, which concerns us most; but, the excess of consumption over production. It can be contended that we can waste as much as we do, and still progress faster than those who waste less, if we can produce an additional amount more than necessary to offset this waste.—P. W. Litchfield at Chamber of Commerce of United States Meeting.



Underground Operation



Whitewash If Put on Hot Dries with a Gloss

Satisfactory illumination in an underground room is difficult to obtain unless the roof and ribs are given a coating which reflects light well. Ordinary whitewash serves this purpose satisfactorily, considering its low cost.

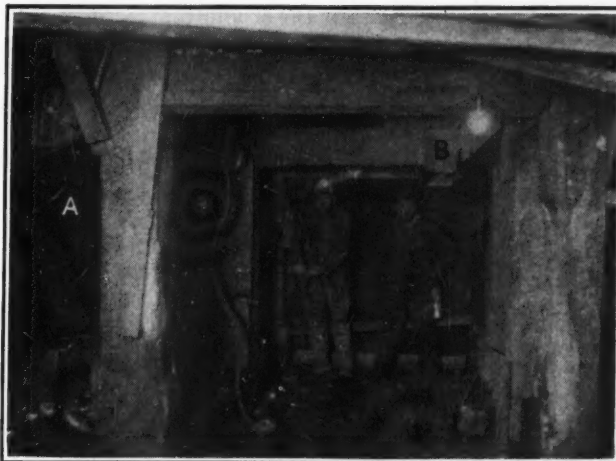
Some time ago when the electrician of mine No. 20 of the Island Creek Coal Co., Holden, W. Va., whitewashed the underground shop he accidentally disclosed a useful principle which is not commonly known.

It came about in this way. Not having other material handy he made up some whitewash from unslacked lime and allowed the mixture to cool thoroughly before applying. There was not quite enough to complete the job, so he mixed some more and put it on without waiting for it to cool.

The contrast was noticeable. That part put on while hot had the appearance of glossy white paint and the other the characteristic dusty appearance of whitewash. The glossy portion was a better reflector of light; it appeared not to collect dust so rapidly and adhered better.

Shaft Can Be Raised For 35 Per Cent Less Than Sinking Charges

In the issue of July 8, p. 50, William Callen, superintendent, Trumbull Coal Co., Clarksville, Greene



County, Pa., describes the work of raising a shaft from a mine to the surface, stating that the work was in progress. He now writes that it is finished and that it cost less by 35 per cent to raise the shaft than it would have done to have sunk it.

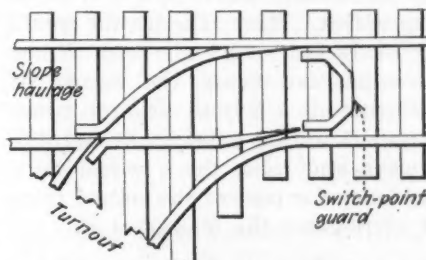
In the illustration below the drillers are shown making one of the buster shotholes over the dirt in the chute. Each round gripped from 5 to 8 ft. and consisted of 27 holes. How clear the walls are from gouging can be noted in this picture. The rock is loaded by gravity into the mine cars and is handled like other rock. With upraising it does not have to be loaded by hand into a kibble and then hoisted out of the shaft. The men also have a greater degree of safety, for the dirt is at no time dangling in a bucket above their heads.

At Receiving End

On the left is the manway *A* and in the rear to the right the chute *B* from which the excess rock was taken. Metal miners never sink a shaft if they can raise it, but coal miners are disposed to do the reverse. Yet raising pays.

Guard Protects Switch Point From Damage

On slope haulways switch points are often greatly damaged by run-



Guard that Keeps Wheels from Striking Switch Point

Whether the switch is open or closed the guard is effective in preventing damage should cars run away or be derailed.

aways and the derailing of cars. To reduce this damage guards have been installed at many turnouts, and they have proved effective. The guard shown in the accompanying illustration was designed by Richard Matthews, a trackman of the Union Pacific Coal Co. It consists of a U-shaped piece of rail spiked in place close to the switch points. The distance between the prongs of the guard is such that the exposed switch point lies within the outer limit of the guard whether the switch is open or closed, so that the wheels are prevented from striking the switch point.

W. W. MEDILL,
Assistant Superintendent,
No. 8 Mine.

Union Pacific Coal Co.,
Rock Springs, Wyo.

Drilling on Top of Raise

The men are standing on temporary scaffolding just above the dirt in the chute. The raise measures 13x19 ft. A manway measuring 4x10 ft. inside dimensions was carried up leaving a chuteway 13x13 ft. At each round of holes from 5 to 8 ft. of rock was shot down.



Viewpoints of Our Readers

Thinks Ventilation with Auxiliary Fans Needs More Careful Thought

MR. C. H. TRIK'S article "Modern Mine Must Have Ventilation System That Suits New Conditions" in your issue of April 29 is full of holes and misleading statements. I note for example that all you need to do to prevent recirculation of air is to use a right-angled bend in the ventilating tube.

Those who are not familiar with the rudiments of the physics of ventilation might find no difficulty in accepting this statement as correct, but how can a ventilation engineer ignore the fact that the difference in frictional head between the point where the branch turns off A (see sketch) and a point even several hundred feet forward is insignificant and measured by a fraction of an inch of water gage, whereas the blower usually makes 1, 2 or 3 in. of depression. Hence the blower would be likely to "suck" air from either direction and unless the volume of the current CD was several times larger than that passing through the blower and tube, there would be a tendency for part of the return from A to re-enter the blower at B.

IS METHANE VISIBLE?

The caption under Fig. 3 is amusing. It is the first time I ever saw a picture used as a means for determining the quality of air. Does Mr. Trik think methane is visible? I do not imagine that he does.

He beclouds the matter by bringing up palpably bad methods of general ventilation and fails to discuss

adequately the crucial matter; namely, the use of blowers in gassy mines, and by "gassy" I mean mines where if the split were shut off by an open door or breakdown of a stopping, some one place would fill with gas.

ONE MINE HAS 50 FANS

One mine of which I have heard has fifty blower fans. The aggregate capacity of these is more than equal to the volume of the main intake. As, under the best of conditions, not more than 50 per cent of the main intake reaches the faces due to leakage, these blowers are recirculating the face ventilation at least twice.

Some of these air splits show a high methane content, and the blowers are shut down two hours before the men go in, during which time the gas accumulates to be circulated when the men return and the fans are restarted. The well-known mining engineer, Frank Haas, chairman of the sub-committee on coal mine ventilation, stated at the annual meeting of the American Institute of Mining and Metallurgical Engineers, last February, that blower fans are being used to cover up the sins of omission of ventilating systems.

Many mines, unfortunately, are being laid out in a manner unsuited to the use of modern machinery and to the ventilation that is needed to make its operation safe. Care should be taken not to add in any way to the hazards of earlier methods.

Mining Engineer.

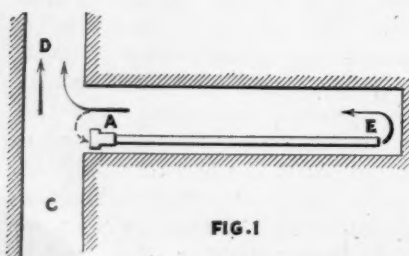


FIG. 1

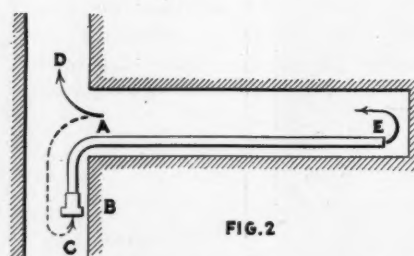


FIG. 2

Canvas Tube Without and with a Right-Angle Turn

Figs. 1 and 2 show two positions, A and B, of the fan or blower. The atmospheric depression caused by the blower may be equal to a water gage of 1, 2 or 3 in. The difference of pressure between A and B is insignificant, and hence about half the volume of air entering the fan would be a back flow or return from A to B. That is, the fan would draw from both C and A unless the volume in the current CD is much greater than the current at B.

Cast-Steel Car Wheels Despite Nine Years of Service Still in Use

Being a constant user of steel mine-car wheels I have been much interested in your editorial, "Lighter Wheels and Heavier Loads," in *Coal Age*, Feb. 18, 1926, and in the letters that followed. I can by no means concur with some of the statements in the letter signed by "Wheelman" in the April 15 issue.

I began using steel mine-car wheels in November, 1917, and have been a constant user of them ever since, and my experience with them has impressed me with their good qualities. When I took charge of the McConville Coal Co.'s operation, in Center-ville, Iowa, during 1917, it was using eighty cars equipped with steel wheels with roller bearings which had been in constant service for two years and had been put to a severe test, for at this operation the wheels are spragged and not provided with brakes. These wheels were so satisfactory that we purchased fifty more sets of the same kind. Until I left this company, Jan. 1, 1922, the wheels had been in daily use, and not one wheel had ever given any trouble. Talking with the owners of this mine a short time ago, they told me they were still using these wheels and had spent no money on them, either for repairs or replacements.

On April 1, 1922, I was appointed superintendent for the Numa Coal Co., Numa, Iowa, and since that time we have discarded all wheels that were not of steel. We use plenty of sprags, and they receive other hard usage. We have spent no money on these wheels since their installation. The miners and other employees who handle cars equipped with these wheels like them, as they are light and easily handled.

The writer of the letter signed "Wheelman," said that most mine-car wheels run loose on their axles. There should be, as he stated, a bearing provided in the wheel itself. The roller-bearing companies furnish a steel shell or raceway to be placed in the hub of the wheel, so that these rollers will run against a steel housing instead of cast iron. This last point is surely much in favor of the steel wheel, as it furnishes, in itself, a steel bearing without a shell or raceway.

WM. H. ALLAN,
General Superintendent,
Numa, Iowa. Numa Coal Co.

Only a Wagon Mine but Miners Use Permissible Lamps and Explosives

I WISH TO CALL attention to the news item in *Coal Age* on page 213 of the issue of Feb. 4, giving an account of the explosion in a wagon mine in Colorado known as the Rifle Gap mine, in which three were killed and a fourth seriously injured. Mr. Cook, the man injured, and his son, who was killed, were customers waiting in the office, about 300 feet from the mine, for a load of coal. Mr. Bracket, the operator, and Mr. Otten, the miner, were the only men in the mine at the time of the explosion. Both were killed.

Conditions at the Rifle Gap mine may be contrasted with those at the wagon mine of Frank Estes, which competes in the same markets. Frank Estes caught the spirit of self-

deg. from the horizontal. He encountered some water and installed a pump, but instead of pumping the water over the mountainside he is wetting the coal dust to prevent it from being inhaled by the miners loading the coal. Estes was one of the first to comply with the state regulations that require wagon mines as well as shipping mines to be inspected for gas before the men enter the mine each morning, to employ a first-class mine foreman, and to install a ventilating fan.

DANGER AT CHUTES

Fearing mine fires and the possibility of igniting coal dust with open lights while loading coal from chutes, Estes equipped his men with electric cap lamps even though this involved buying an extra set of batteries, it being necessary to leave one set in town each day to be recharged. Further to minimize the explosion hazard he uses permissible explosives exclusively for shooting and has plans made for rock-dusting his entries.

Frank Estes deserves credit as a leader among the small coal operators in the safety movement. His mine is on government land. The outward appearance of his property is typical of many Colorado wagon mines.

Explosions in wagon mines are of frequent occurrence in the West, but little is heard about them as the men are usually out of the mine when the coal is shot, or only one or two are killed and that in an isolated place where the news does not reach the press. WESTERN ENGINEER.

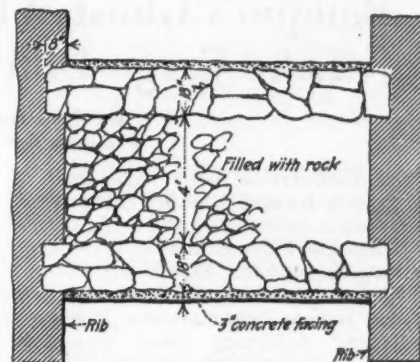
Denver, Colo.

Stoppings Ratproof and Impervious to Air

In the issue of *Coal Age* of July 8, E. D. Clarke on p. 50 comments on the advantage of cement and clay for the making of stoppings. For several years while I was mine foreman of Mine No. 6 of the Berwind-White Coal Mining Co., Horatio, Pa., I had much experience in that direction. The mine being gaseous, it was vital that the stoppings should be airtight. So different methods were adopted but the rats made holes in the stoppings we erected and, therefore, for economy's sake I tried the following method: Hitches were cut in the coal ribs 8 in. deep and two walls of rock 4 ft. apart and

each 18 in. thick were erected. The space between the walls was filled tight with slate rock. The walls were faced with cement mixed with screened road cleanings in proportion of 1:3. This method gave excellent results. The facing mortar neither deteriorated nor cracked. The stoppings were airtight.

For ten years I was with the Buffalo & Susquehanna Coal & Coke Co., as superintendent. Here I had other stoppings built of the same



Stopping That Endures

The two walls are each morticed separately into the coal ribs and faced with cement and road screenings, rock being piled loosely between the forward and the rear wall. Stoppings thus made give long and efficient service.

character. Our general manager, James Harvey, can vouch for the excellence of the results attained. Road screenings are cheaper than sand which has to be loaded and unloaded. This takes both time and labor.

Mase, Pa.

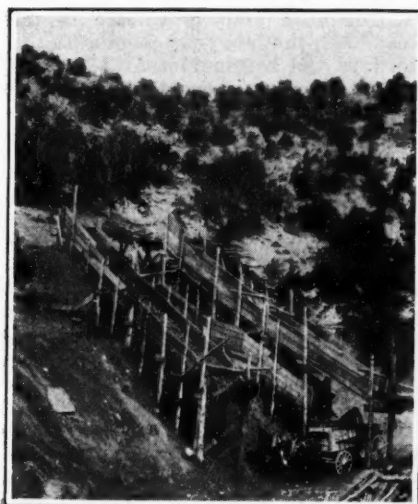
J. J. CLARK.

Loading Equipment Installed At Union Pacific Mines

In reading your Staff Correspondent's report on the Cincinnati meeting of the American Mining Congress I notice that there is an error in paragraph three of the article, Vol. 29, p. 793, which states that the first two loaders were installed by our company in 1916, and that we have thirty-eight Thews and twelve Joys. We have only four Thew machines and twelve Joys. It also stated that at another operation we have six Goodman scraper loaders and two Eickhoff conveyors, and at a third, three Eickhoffs. What I said was that we have one Goodman scraper in operation and six additional scrapers of our own design on order. The number of Eickhoffs (two at Rock Springs and three at Superior) is correct.

GEORGE B. PRYDE,
General Superintendent,
Union Pacific Coal Co.

Rock Springs, Wyo.



Wagon Mine at Rifle, Colo., Gives Safety Its Proper Place

This mine sprinkles the coal, has gas inspection, a first-class foreman, a ventilating fan, closed lights inside and out and permissibles. Only a few men, only a small mine, but men are men, and mines are mines, and Frank Estes would have both safe.

preservation and of safety for his men from the new mining regulations in Utah, and the practices of the leading operators in Colorado and Wyoming.

At the time of this explosion, Estes was leading the country in safety measures for wagon mines. Some of the earlier operators of wagon mines in this country had experienced explosions when their mines were in but a short distance from the outcrop.

Estes' mine has been driven but 700 ft. into the side of the mountain where he is mining about 40 tons of coal a day from a bed of coal 8 to 9 ft. thick standing at an angle of 77



News Of the Industry



Jacksonville Agreement Plays Role of Banquo's Ghost When Fight to Widen Lake Cargo Differentials Is Reopened

By Sydney A. Hale
Associate Editor, *Coal Age*

The Jacksonville wage agreement of 1924, like Banquo's ghost, bobbed up and would not down when the battle to widen the differentials on lake cargo coal rates between the Northern and Southern producing fields was reopened before Commissioner Henry C. Hall and Assistant Chief Examiner Charles F. Gerry of the Interstate Commerce Commission at the Marlborough-Blenheim Hotel, Atlantic City, N. J., last week.

Counsel and witnesses for the Pittsburgh and Ohio No. 8 fields and their allied commercial interests, at whose petition the Commission had consented to reconsider its decision in *Lake Cargo Rates, 1925*, 101 I. C. C. 513, insisted, as they had in the original proceedings three years ago, that the rates to the lower ports from Ohio and Pennsylvania were unjust and unreasonable *per se* and that the differentials over those rates paid by southern West Virginia and eastern Kentucky were so small that they deprived the Northern fields of their natural advantages of location.

To establish these contentions, they offered exhibit after exhibit showing further losses in lake business to the complaining districts in 1924 and 1925 and additional cost studies to show that the railroads were in a better position to stand a reduction in rates than they were when the case was originally heard. Every change which has taken place since the record was first closed, they said, had worked to the prejudice of the Northern fields.

Hall Defends Commission

In the course of the testimony offered exceptions were taken to a number of statements made by the Commission in its decision in the case. Commissioner Hall, who wrote the decision, examined the witnesses closely on these points, seeking to defend the language of the opinion under attack by the complainants. This examination developed some nice points in interpretation.

Again and again counsel for the defendant railroads and for the intervening Southern operators pounded at the witnesses to compel them to admit that the real handicap under which the Northern fields labored was an excessive wage scale. This cross-examination at times brought A. C. Lewis, of counsel for District No. 12 of the United

Mine Workers, into the picture. While witnesses for the complainants did not deny the handicap of higher wage rates, they stuck persistently to their contention that the existing rate adjustment worked serious damage to the prosperity of the Northern fields.

Objection by counsel for the complainants to this line of cross-examination as touching issues not raised in direct examination or before the Commission was met by opposing counsel with the statement that when complainants made showings of losses which they charged to the rate adjustment it was proper to develop that the losses were due to causes other than freight rates. Countering this, when their objections were overruled by the Commissioner, counsel for the complainants on redirect examination would bring out that the Jacksonville agreement merely continued wage rates which had been in effect since the summer of 1920.

Complainants Lose a Point

Defendants and the Southern intervenors won a victory on the first day of the hearing, July 20, when Commissioner Hall denied the petition of the Ohio No. 8 and Pittsburgh producers for permission to amend their complaint by striking out the attack upon rates from the Pittsburgh district to Sandusky and from the No. 8 and Cambridge districts to Sandusky and Toledo. This petition was sharply opposed as an attempt upon the part of the complainants to bolster up their case by eliminating long-haul traffic. Counsel for the complainants took an exception to this ruling and at the close of the hearings last Friday renewed their motion and asked that it be passed upon by the full Commission.

C. J. Goodyear, formerly commissioner of the disbanded Pittsburgh Coal Producers' Association, was the first witness. Mr. Goodyear offered a num-

ber of exhibits which supplemented his testimony in the original hearings by bringing figures down to date. In 1925, for example, although lake cargo shipments were 14.59 per cent greater than in 1924, Pittsburgh district shipments declined 35.17, and Ohio, 63.74 per cent. All-rail shipments from the Appalachian Region to Central Freight Association territory increased from 109,166,513 tons in 1924 to 122,891,566 tons in 1925, but shipments from Pittsburgh and the No. 8 and Cambridge districts declined from 25,921,826 to 19,704,899 tons.

Lake cargo movement by districts in 1909, the year when the Southern fields first began to ship in volume to the lakes; 1923, the last year covered in the record in the original case; 1924 and 1925, as summarized from the Goodyear exhibits, is shown in Table I.

Revenues Justify Decrease?

G. W. Oliver, appearing for the No. 8 operators, presented the results of a study of the freight operating expenses of the Bessemer & Lake Erie, Wheeling & Lake Erie, Erie, Pennsylvania, Pittsburgh & Lake Erie, Baltimore & Ohio and New York Central railroads for 1922-25. According to Mr. Oliver these roads had an average freight operating expense of 9.54 mills in 1922, 8.64 in 1923, 8.68 in 1924 and 8.31 mills in 1925. In every case reductions had been effected in the cost per ton of coal consumed and in the number of pounds used in road service per 1,000 gross ton-miles.

The witness also made an analysis of the lake cargo and commercial coal movement over roads serving the Pittsburgh, No. 8 and Cambridge districts to show the greater concentration in the former movement. A study of ore and coal traffic at Cleveland in 1923, he further testified, made it plain that from 93.8 to 98.7 per cent of the cars bringing in lake coal could be used for return loading of ore in the direction of the mines, as against 40.8 to 43.7 per cent maximum of commercial coal cars so available.

In further support of the claim that the lake cargo traffic moved during the months when transportation service was at its best and costs the lowest, the witness made comparisons of gross tons

Table I—Lake Cargo Coal Shipments in Net Tons 1909, 1923, 1924, 1925

District	Rate*	Tons			
		1909	1923	1924	1925
Total Lake Cargo.....		15,350,559	29,839,918	22,981,048	26,333,184
Pittsburgh.....	166	7,842,971	7,977,903	5,249,209	2,106,587
Ohio No. 8.....	163	1,325,085	3,716,307	2,851,212	1,316,428
Hooking.....	163	1,999,670	919,927	90,165	115,496
Kanawha.....	191	1,776,986	4,581,656	5,754,567	7,803,062
Fairmont.....	181	1,277,011	2,532,320	885,819	1,623,499
Kentucky.....	191	7,489	3,297,476	3,514,355	6,606,932
Pocahontas.....	206	798,818	2,445,507	2,630,625	3,143,020

*In cents per ton.

per train hauled, train speeds, gross ton-miles per train hour and coal consumption. These all showed more favorable results from April to November than during the other four months of the year. A consolidated statement of selected freight operating expense items gave a cost of \$1.07 per 1,000 gross ton-miles during the winter months and 93c. during the other months.

Suffers from "Double Pneumonia"

Thomas A. Dunn, chairman of the general traffic committee of the Pittsburgh Chamber of Commerce, testifying Thursday morning, furnished a brief interlude to the flow of statistics when he declared that the Pittsburgh district was suffering from double pneumonia. An unfair rate adjustment had been congesting one commercial lung. The other lung, he admitted, had been affected by wage troubles, but these were clearing up. Another simile was introduced into the record on Friday, when Dr. Charles Reittel compared the situation to a double-barreled shotgun. One of the opposing counsel remarked that it was a most unusual weapon—the freight differential barrel carried the complaining districts forward, but the wage-rate barrel recoiled and pulled them backward.

Walter D. McKinney, formerly commissioner of the defunct Southern Ohio Coal Exchange, said that in the twenty-nine months ended May, 1926, mines on the Hocking Valley Ry. had averaged 12.6 per cent running time. In 1906 the Hocking Valley, built to develop the coal tonnage of southern Ohio, originated 3,398,690 tons of coal and received 539,761 tons from its connections; in 1925 the road originated 1,085,000 tons and received 17,555,000 tons from its connections. In 1924 Ohio output was 7,500,000 tons less than in 1923; in 1925 there was a further loss of 3,800,000 tons. The "Crescent" production in 1924 showed a falling off of 4,000,000 tons, but in 1925 an increase of 17,800,000 tons.

In 1918, continued Mr. McKinney, southern Ohio shipped 25.4 per cent of its output to the lakes; in 1919, 13 per cent; 1920, 18 per cent; 1921, 11 per cent; 1922, 20 per cent; 1923, 13 per cent; 1924, 2.7 per cent and in 1925, 5 per cent. In 1896 the Hocking district contributed 19.4 per cent of the lake cargo tonnage and the Pittsburgh district 65.5 per cent; in 1925 the Hocking proportion was 0.43 per cent and Pittsburgh shipments 8 per cent.

George S. Brackett, one-time executive vice-president of the Northern West Virginia Coal Operators' Association and now employed by the Consolidation Coal Co., was the only witness appearing for northern West Virginia producers with mines on the B. & O. This group, he explained, make no charge that rates from the Southern districts discriminate against the Fairmont field, but direct their attack against the relationship between rates from the Pittsburgh and Ohio fields on the one hand and northern West Virginia on the other. A. G. Gutheim, counsel for the Pittsburgh operators, brought out on cross-examination the large interests of the Consolidation company in the Southern field.

British Miners' Vow to Work Only 7-Hour Day Or Starve Not Rigidly Observed

All the miners in Great Britain are not idle because of the strike. Many of them in South Staffordshire and in South Wales, particularly in the upper Rhondda Valley, have been working for themselves, digging and selling coal obtained from outcrops and shallow seams. Men who avow they would rather starve than work longer than the seven hours hitherto prescribed are laboring with pick and shovel 12 to 14 hours per day in some instances to win coal that is bringing from \$7 to \$10 a ton, without any middleman taking a profit.

In South Wales and other fields where the men take precautions to avoid infringing surface rights and otherwise damaging the property two drifts are driven—one of the inclined longitudinal shafts being for the intake air and the other for the return, thus providing some ventila-

tion to the workers. Only as much coal is taken as can be readily brought to the top and yet provide working room. The average width of such a working is from 12 to 15 ft. After it has been driven 100 yd. or so, the men open up side-drives on either side. As there is no timbering, cave-ins are not unusual and deaths have not been few.

A number of these mining strikers work separately in the Midlands and in Yorkshire. In Wales from ten to twenty dig out an outcrop on equal shares, the work being arranged in shifts.

In various localities, watchers on the surface, with outposts stationed a mile and more away, keep a sharp lookout for such intruders as union "vigilance" officials, the local colliery manager, the mineral agent or the police.

In 1910, according to an exhibit offered by Mr. Brackett, the northern West Virginia operators on the B. & O. shipped 7.9 per cent of the lake cargo total; in 1924 the percentage had dropped to 2.4 and in 1925 to 4.4 per cent. In both of the latter years the actual tonnage from those B. & O. mines was less than in 1910. No testimony was offered on behalf of operators with mines on other railroads in the Fairmont region. George T. Bell, however, entered an appearance for the Monongahela Coal Operators' Association.

Bank Deposits Below Average

Deputy Secretary of Banking Taylor, a witness for the Pennsylvania Public Service Commission, testified that deposits in state banks in 14 counties in which the annual production of bituminous coal exceeded 1,000,000 tons had increased only 30.4 per cent between Dec. 31, 1921, and April 12, 1926, as compared with 46.3 per cent for the state as a whole and 53.9 per cent for the state exclusive of those fourteen counties.

Jerome Watson, head of the division of mines, Ohio Department of Industrial Relations, testified to tightened conditions in the mining counties of the state. Dr. Reittel presented a statement of idle miners' houses in the Pittsburgh district, which led to a demand for more complete data. W. E. Wilson, vice-president of the Wheeling (W. Va.) Chamber of Commerce, expressed the hope that some help could be extended the coal mines in his district.

Central Pennsylvania also demanded a place in the lake sun. Charles O'Neill, secretary, Central Pennsylvania Coal Producers' Association, said that that region must seek new outlets for tonnage since the Interstate Commerce Commission had opened up New England and the Middle Atlantic states to southern West Virginia in another proceeding. He indorsed the position

of the major complainants, particularly with respect to rates from the low-volatile fields, and protested against the splitting up of central Pennsylvania into a number of small rate groups. W. S. Bronson, of counsel for the Southern carriers, and J. V. Norman, of counsel for the Southern operators, protested in vain against the admission of Mr. O'Neill's testimony.

Illinois Fights for Tonnage

W. Y. Wildman, Illinois Coal Traffic Bureau, declared that increasing differentials against Illinois coal to the Northwest made a fight against further advantages to Eastern producers imperative. He was opposed to any reduction in the rates on lake cargo coal from Ohio or Pennsylvania and thought that the differentials against the Southern fields should be increased. Rates, he declared, had as much bearing upon Illinois' plight as a non-competitive wage scale. He conceded that mileage was not the only factor to be considered in fixing differentials and said that wages might be a factor. The differentials under attack, however, yielded much lower ton-mile earnings than did the differentials fixed by the Commission in several other coal cases.

Connellsville ought not to be ignored in any adjustment of lake cargo rates, asserted Traffic Manager Manson of W. J. Rainey, Inc. Mr. Manson testified that the Connellsville district was as favorably situated as Pittsburgh in the matter of providing return ore loading on cars used in the movement of lake coal.

Commissioner Hall tentatively set the next hearings for Sept. 14 at Washington. At that time the defendants and the Southern intervenors will be heard. Certain of the complainants' witnesses will be recalled for cross-examination. H. L. Findlay, sales manager, Youghiogeny & Ohio Coal Co., and John S. Jones, president, Sunday Creek Coal Co., also may testify on the commercial aspects of the situation.

New Frick Dock and Haulage System at Palmer, Pa.

The H. C. Frick Coke Co., Pittsburgh, Pa., has started work on its second underground haulage system which when completed will convey coal from seven of the company's mines to a new loading dock that is to be built at Palmer, Pa.

This installation is to be quite similar to the one now operating at the Colonial dock. All coal produced at Filbert, Footedale and Buffington Mines (in the past Filbert has been a coal-shipping and Footedale and Buffington coke-producing plants) will be hauled underground to a point at the extreme rear of the Filbert property, where it will be dumped by means of rotary car dumps into a storage bin or bins in a manner similar to that at Colonial dock. From this point to the Monongahela River, which is distant approximately 14,000 ft., a belt conveyor will be installed in the heading driven on a straight line from this dump to the river. This will permit the use of much longer units than usual.

In addition to the three mines mentioned, this belt also will serve Lambert, Ralph and Palmer. At the present time all the coal produced by these three plants is being hauled to Palmer Shaft, where it is hoisted and delivered over a single belt conveyor to barges on the river.

The combined output of these six mines is to be 12,000 tons per day.

The coal will be brought from the level of the seam through a slope sunk on about a 15-deg. inclination, this slope passing underneath the Monongahela R.R. This necessitates a slope about 700 ft. long.

The river tippie will be located on the river bank and will have a storage capacity of 2,000 tons, the bin being built of sufficient length to load the full length of a barge without necessitating any moving of the barge while being loaded. This harbor will be arranged so that a barge can at any time be loaded out in ten minutes, so as to allow ample time for handling river coal.

No provision is being made for sizing coal, it being the intention to ship all coal from this dock as run-of-mine.

Railroad loading also is being provided for at this bin, which will allow the full output of these mines to be loaded in railroad cars at any time it may be desirable to change the method of transportation or destination of the coal.

The conveyors will be similar to those now in use at Colonial dock. All bearings will be of the anti-friction type, and high-grade equipment will be used throughout the entire installation.

Work has already been started on this installation, and the entire project will be pushed through to completion as rapidly as possible.

The Shannopin Coal Co., a subsidiary of the Jones & Laughlin Steel Co., has applied at the office of the U. S. Engineers at Pittsburgh for a federal permit to construct a river terminal on the left bank of the Monongahela River just below Dunkard Creek, Greene County, Pa.

Open-Price Associations Being Probed

In discussing the status of its investigation of open-price associations, the Federal Trade Commission has issued the following:

"On March 17, 1925, the Senate directed the Commission to investigate the number and importance of open-price associations, the effect of their activities on prices and the nature of their other activities with particular reference to alleged violations of the anti-trust laws. This inquiry was initiated immediately after the opinion of the Attorney General as to the availability of the appropriation for this work was received."

Coal Mine Insurance Rates Advanced Sharply

The Associated Companies have materially increased their rates for coal-mine compensation insurance, because of bad experience.

The new rates have already been filed in several states where past experience was exceptionally bad and they all show an increase of about 100 per cent over the previous schedule. It also was reported that the members of the Associated Companies have withdrawn from Alabama because conditions make it impossible to have the new rates approved.

The new rates so far filed on behalf of the Associated Companies are as follows: Alabama, \$6.02 per \$100 of payroll; Tennessee, \$6.62; Virginia, \$9.20; Kentucky, \$11.16; Oklahoma north of the Canadian river, \$12.40; south of Canadian river, \$15.50.

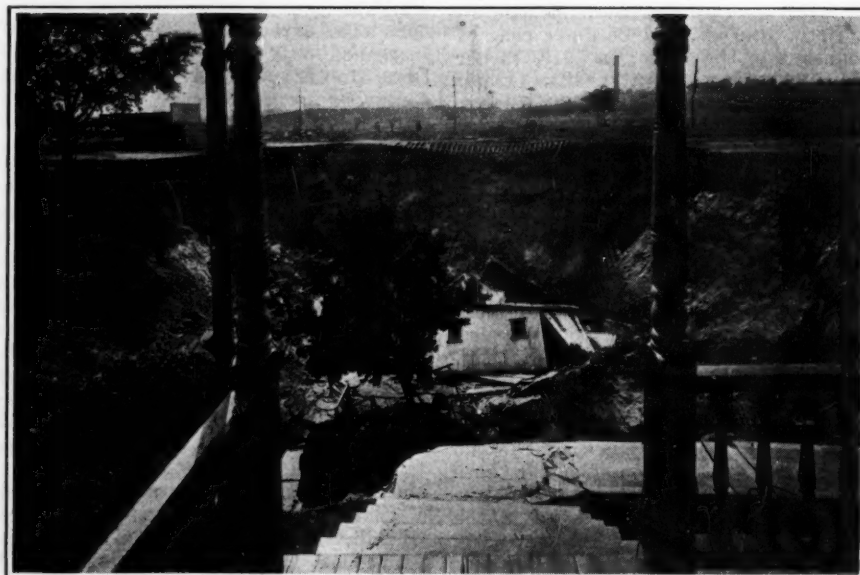
The Travelers Insurance Co. has agreed to write coal-mine risks in Virginia at the rate of \$6.10 per \$100 of payroll, compared with the old rate of \$4.73.

Permanently Enjoins Mining Beneath Sewickley Bed

Judge I. Grant Lazelle, of the Circuit Court of Monongalia County, W. Va., has made permanent a temporary injunction involving the right to mine coal in overlying and underlying veins which may have a far-reaching effect. On July 23 his enjoining order was handed down in the case of the Continental Coal Co. of Scott's Run, W. Va., which owns 153 acres of Sewickley coal. This company several months ago obtained a temporary injunction restraining the Connellsville By-Product Coal Co., which owns 2,100 acres underneath the Sewickley coal, from taking out all of the Pittsburgh coal, making the plea that such action would cause the Sewickley coal to fall and render it valueless. It develops that while the owners of the Sewickley coal had started to mine their holdings in 1921, the owners of the Pittsburgh coal have a prior right and claimed that by the very nature of that right they could not be halted from mining any or all of their coal, regardless of what might happen to the Sewickley coal above. Attorneys for the Pittsburgh coal interests have signified their intention of taking the case to a higher court and it is indicated that the case may eventually reach the U. S. Supreme Court.

May Develop Korean Mines

Shanghai, China, June 24.—It is stated here that the Japanese-administered government-general of Korea will at the earliest possible date undertake operation of collieries in North Hamkyong Province. The end in view is to be independent of the Tokyo government financially and at the same time solve the fuel problem there. The authorities of the government-general are desirous of carrying out this plan during the next fiscal year and have approached the Japanese department of finance with the proposal.



Houses Settle When Mine Workings Subside

Scene from doorway of one of the houses that threatened to disappear when a large area over the workings of the Glen Alden Coal Co. at Parsons, Pa., caved in on July 17. Pillar robbing in the Hillman vein where it pitches on a 60-deg. angle, 80 ft. below the surface, is believed to have been the cause.

Administration Interest in Scheme To Mediate Coal Disputes Scouted; Union Feeler, Some Operators Think

By Paul Wooton

Washington Correspondent of Coal Age

Forgetful of the gossip which emanated from Swampscott when the anthracite strike was in progress, some in Washington apparently have taken seriously the stories coming from Paul Smiths concerning the administration's interest in a government agency for the mediation of coal disputes to function along the lines of the recently created railroad commission. Detached as the President is from the White House, there are days when his spokesman has little news to contribute. As a result, the newspapermen frequently take a scrap or two of news, and, as was done with the loaves and the fishes, multiply them into a column.

If the President's views, expressed in recent dispatches, have been interpreted correctly, none disputes that it is a development of first importance. In the words of one of the correspondents, the President "was advised recently that the coal miners, eager for industrial peace, who have been assured that their differences with the operators can be amicably settled under the auspices of a governmental agency such as is created under the Watson-Parker Act, are ready to discuss terms."

At the National Coal Association it is apparent that the statement is received with skepticism, although enough curiosity was evinced to prompt an effort to verify it. If it is true it is a reversal of the position on the part of the mine workers and has a very important bearing on the legislative situation. Their opposition to arbitration has been continuously emphasized in the last few years. In fact, the whole American labor movement has been actively opposed to wage adjustments by government machinery. The mediation board set up by the Watson-Parker

law is not an exception to this position, for it represents considerably more liberty of action than did the Railroad Labor Board which was supplanted.

Some operators are of the opinion that certain leaders of the mine workers have put out a feeler to determine the attitude of the administration, as the mediation board offers one way in which the union leaders can escape responsibility for the impossible situation that confronts them. They cannot accept a wage cut voluntarily with good grace, because of the slogan, "No backward step." They perceive the difficulty of getting the present scale renewed or even of getting any sort of contract in many of the districts.

In operator quarters it is stated that signs are multiplying that the strength of the union is wavering. Not the least of these is the report of the movement to form a new miners' organization for the states west of the Mississippi River. Prolonged idleness and the sight of even Illinois coal in their markets, to say nothing of non-union shipments, has led some of the Missouri miners to realize that the interests of the West no longer are the interests of the East. This has given rise to a demand for district autonomy in the matter of wage agreements.

Whatever the attitude of the miners may be, the operators as a group apparently are not likely to favor the move if it is to take the form of legislation. Senator Copeland's comments on the President's utterance show that the introduction of any bill providing for mediation alone would be seized upon by the proponents of further legislation as a vehicle for adding the other features of compulsory fact finding and emergency control of distribution.

Door to Peace Open, Says Baldwin; Union Leaders Balk at 8 Hours

"The door is still open" for negotiation of a settlement, but the government cannot enlarge its subsidy offer, declared Premier Baldwin in an address to the House of Commons Monday.

A conference of miners' delegates has been called for Friday "so that the men may have an opportunity to tell their leaders whether they have done right or wrong," announced A. J. Cook, secretary of the Miners' Federation, on July 26.

These statements epitomize the present situation in the British coal strike, which is now closing its third month.

Mr. Baldwin's reiteration of the government's position came in the course of a desultory debate upon the suspension. Lloyd George opened the discussion with a criticism of the Conservatives for declining to accept the peace program of the bishops. Concessions made by the miners to that plan, he said, brought it within the scope of earlier declarations of the Premier. Mr. Baldwin replied that the period of reconstruction would certainly exceed the four months suggested in the bishops' memorandum and that the government declined to saddle the burden of a subsidy for that or a longer period on the country.

"Emperor" Cook prefaced his appeal to the strikers to come out and "not to hide the truth from their leaders" with a statement that the appeal was not to be construed as a sign of weakening. On the contrary, said Mr. Cook, the executives of the Miners' Federation had resolved that they would neither meet the government nor the coal owners, even to discuss an agreement, so long as the proposal for longer hours was there. He himself would resign rather than carry out instruction to sign an agreement conceding an eight-hour day. They wanted to discover, however, whether the men were of the same mind, and he hoped they would not keep the truth from their leaders.

The strike leader's call for a conference came on the heels of his return from Warwickshire, where he had made an unsuccessful week-end campaign against the resumption of work at pits in that field. London reports that a large number of men in that district have returned to work and the union executives are naturally fearful of the effect that movement may have upon the solidarity in other fields, in some of which symptoms of disaffection have appeared.

Production in Illinois is holding up well despite the small number of mines in operation, according to the report of the Department of Mines and Minerals. The total output of 147 mines for the month was 4,044,135 tons at an average of 13.5 days worked, employing 45,161 men. Fatalities totaled 3. The tonnage in June, 1925, was 3,809,357. Twelve strip mines in the state reporting produced 275,237 tons as compared to 398,818 tons a year ago.



Mine Cave-In Causes Many to Flee from Homes

Momentarily expecting their homes to be engulfed when a large area over the workings of the Glen Alden Coal Co. near Parsons, Pa., caved in on July 17, thirty-five families fled from their homes. No one was injured, as the residents had ample warning. The picture shows a portion of the tracks of the Delaware & Hudson R.R., which rushed workmen to the scene to dump ashes in the affected roadbed.

Bureau of Mines Is Reorganized; Technologic, Economic and Safety Branches Set Up by Director Turner

With the advent of the new fiscal year Director Turner of the Bureau of Mines now is in a position to put into effect the changes looking to a simplified and more effective organization of the work under his direction. An order just has been issued formally creating a technological branch, an economic branch and a health and safety branch.

Dr. O. P. Hood, who has served the Bureau since 1911 as its chief mechanical engineer, has been selected to head the technologic branch. Dr. R. R. Sayers will be chief of the health and safety branch. The economics branch, which has been functioning since Jan. 1, is headed by C. P. White, as was announced at that time. Daniel Harrington, of Salt Lake City, is to be chief engineer in charge of the safety service division.

J. W. Paul has been relieved of his duties as chief of the mining section of the Pittsburgh station and as chief coal mining engineer. Hereafter he will bear the title of "senior investigator" on the study of special problem of falls of roof and coal. He has chosen John N. Geyer as his assistant. The assignment of Mr. Paul to this particular task is an effort to concentrate on this major cause of accident which is responsible for 50 per cent of underground fatalities in coal mines. The Bureau heretofore never has been able to concentrate on that problem because of lack of funds. Now that Congress has voluntarily voted a special appropriation for that work, Director Turner has chosen the member of his staff who is regarded as being particularly qualified for that undertaking.

The creation of the technical and economic branches follows the recommendations of the Reynders Advisory Committee. Mr. Turner, however, felt that the importance of the Bureau's safety work is such that it should have co-ordinate rank with the other major

subdivisions of the Bureau's work. More than that is involved, however.

The direction of rescue operations and of the educational work in safety did not fit in well in either the technological or economic branches. The research work on explosives, mine lamps, rock-dusting and other matters pertaining to safety will be handled in the technological branch.

The original plan to make the chiefs of branches assistant directors of the Bureau has been held in abeyance. Such plan would require legislation.

During the period that the Bureau's organization has been under study Dr. Dorsey A. Lyon has been serving as assistant director, chief metallurgist and supervisor of stations. In addition he has been in immediate charge of all the technological work. Under the new order he will be relieved of a portion of the burden he has been carrying. He has chosen to retain his place as chief metallurgist and also will continue to supervise the experiment stations. This will enable him to carry out his desire to spend most of his time in the field.

Best Plan, Says Dr. Lyon

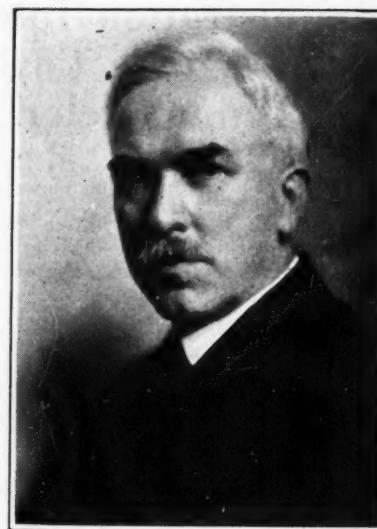
Dr. Lyon, who has been more closely associated with the study of the organization problem than anyone else, expresses the opinion that the new plan is by far the best scheme under which the Bureau has operated.

The health and safety branch will include the safety service division, of which Mr. Harrington will be in immediate charge, and the chief surgeon's office. The fact that Dr. Sayers has been made chief of the health and safety branch is not to interfere with his continuing as chief surgeon of the Bureau.

There are two subdivisions of the safety service division. One is the instruction section, of which John J. B. Forbes will be chief engineer. The other is to be known as the emergency section, of which D. J. Parker will be chief. In the instruction section, G. S. McCaa will be in charge of the primary instruction unit. Mr. Forbes will act as the head of the other subdivision, which is to be known as the advanced instruction unit.

Mr. Forbes will have charge of the stations, cars and staffs for instruction purposes. The emergency section chief will have charge of these same stations, cars and staffs when an emergency arises. In the event of a disaster, Mr. Parker will have wide powers in calling to his assistance anyone in the Bureau's service. Under this arrangement there will be no division of authority in case of an explosion; responsibility will rest on one man.

The work of the experimental mine at Bruceton is being separated from the work of the mining section of the Pittsburgh station. H. P. Greenwald has been appointed section chief in charge of the work at the experimental mine.



Dr. O. P. Hood

He will continue to report to George S. Rice, the chief mining engineer, through A. C. Fieldner, superintendent of the Pittsburgh station.

Under the new arrangement one of the most important places is that to be filled by Mr. Harrington. The Civil Service Commission conducted a special examination looking to the creation of a list of eligibles for the position of chief engineer of the safety service. Thirty-four persons qualified, but the best grade was made by Mr. Harrington.


While Mr. Harrington has been engaged in consulting practice for the past two years, he is an old Bureau of Mines man. He joined the Bureau in 1914 as a mining engineer. In 1920 he became the Bureau's supervising mining engineer. Mr. Harrington was graduated at the Colorado School of Mines in 1900. Prior to his service with the government he was engineer and chief engineer of the Utah Fuel Co. Later he was general superintendent of the Big Horn collieries at Crosby, Wyo. He also worked in a consulting capacity with the United States Smelting, Refining & Mining Co. He is perhaps known best for his work on ventilation in the mines in the Butte district. He is regarded as one of the best qualified men in the West on mine safety and ventilation.

Weirton Steel Co. to Build Two Coal Docks


The Weirton Steel Co., in addition to expending \$750,000 on docks along the Ohio River at its works at Weirton, W. Va., also has undertaken to build a coal loading dock near its coal fields in western Pennsylvania. The coal dock will be located on the Monongahela River near Palmer, Pa., and the operating company will be known as the Redstone Coal & Coke Co. The Palmer dock will be of such size as to handle 450,000 tons of coal, or about 6,500 hopper cars if moved by rail. Completion of both these coal docks will mark important savings by the Weirton company in its coal transportation costs because of the use of the water route via the Monongahela and Ohio rivers.



Dr. R. R. Sayers



News Items From Field and Trade



ALABAMA

Mine Blast Kills Nine.—Nine men—three whites and six negroes—are reported to have been killed July 21 by a local explosion in the Dixie mine of the Moffat Coal Co., which is located at Moffat, Bibb County, on the Mobile & Ohio R.R. Representatives of the state mine inspection department and the U. S. Bureau of Mines are investigating the cause of the explosion. According to C. H. Nesbit, chief mine inspector, "it was a local gas explosion, but beyond that little has been learned."

ILLINOIS

New Record for Sangamon County.—Peabody Mine No. 6 on July 14 set a record for Sangamon County and the Springfield district by hoisting 4,787 tons of coal in an 8-hour day.

Burning Freeburg Mine Sealed.—A blast set off July 10 to shoot coal in the Reichert Coal Co.'s mine at Freeburg, set fire to coal in one of the rooms in the mine and the shaft sealed July 14 in an effort to smother the flames. The fire was discovered Monday, July 12, when the men went to work. By that time it had gained such headway that all efforts to check it failed. A mine rescue team from Duquoin, Ill., was called but the smoke was so dense and the heat so intense the men could not enter the room in which the fire was raging. W. A. Wilson, manager of the mine, stated the mine probably would have to remain sealed for two months. Sixty men will be idle as a result. The mine was the only one in the Freeburg district that was working. It had been operating two and three days each week.

Mine No. 18 of the Industrial Coal Corporation, near West Frankfort, has resumed operations after three weeks' idleness for needed repairs. Over 600 men are employed at the shaft.

Taylor Coal Co. Mine No. 5, between Zeigler and Royalton, has reopened, and Mine A, at Herrin, has resumed, both having been idle for quite a period.

Bell & Zoller No. 1 mine, at Zeigler, resumed operations July 10 after a shut-down of several months. The mine employs approximately 1,200 men when running full time.

Old Ben No. 11 Resumes.—Old Ben Mine No. 11, at Christopher, employing 750 men, resumed production July 20. The mine had been idle four months.

State Buys Illinois Union Coal.—According to an official statement issued by Governor Small to John H. Walker, president of the Illinois Federation of Labor, all coal used by the State of Illinois, including that burned in state

institutions is mined in Illinois at union mines. Miners in various districts had made a complaint to President Walker stating that reports had been current to the effect that non-union and coal other than that mined in the State of Illinois was being contracted for by L. H. Becherer, purchasing agent. According to a statement Becherer gave to Governor Small, all coal contracts now in force are with Illinois union operated mines. He added that the same had been true throughout his entire administration.

Coal-loading machines recently were added to the equipment of the Old Ben mine No. 8, Zeigler. The new devices will have a maximum capacity of 250 tons per day.

Trustees of the bondholders of the Hallidayboro mine, one of the largest in the Duquoin field state that the mine is being taken over by New York capitalists and will resume operations in August. The mine has been closed about three years.

INDIANA

Cosgrove-Meehan Expands.—The Cosgrove-Meehan Coal Corporation, which heretofore has confined its operations to Pennsylvania and Illinois, has extended its activities by entering the coal fields of Indiana. Effective July 1, this corporation acquired three large shaft mines in the Clinton section, near Terre Haute. The mines acquired were put into full-time operation, which at the present rate will mean more than one million tons annually. The entire output is contracted for and the corporation plans further development. Exclusive of the new holdings, the output for the concern for June was the largest in its history and the total for the first half of the year was 35 per cent higher than in the corresponding period last year.

Assurance that the Indiana Public Service Commission would place its approval on the plan for improvements costing \$75,000 in the coal-handling facilities at the municipal light and power plant at Fort Wayne, has been given city officials who recently conferred with members of the commission. The plant will purchase new coal bunkers, larger storage bins and a large coal hoist.

KANSAS

Group life insurance providing for the protection of fifty-four employees of the Cherokee Coal Co., at Cherokee, recently was placed with the Prudential Insurance Company of America. Each worker is eligible under this plan to

protection of \$3,600, making the total coverage \$194,400. The policy is issued under the contributory arrangement, the employees paying part of the premiums and the company assuming the remainder of the cost.

KENTUCKY

The Fordson Coal Co. interests, controlling 120,000 acres of coal and timbered land in eastern Kentucky, and other big holders in Bell and Harlan counties are co-operating with the State Forestry Department and the newly formed Kentucky Forest Service Fire Protective Association, which is forming local associations and arranging for warden and fire patrol service in the mountain timbered country. Over 350,000 acres of timbered land will be carefully watched, and other associations formed.

The Zion Coal Co., Henderson, has let a contract to rebuild the company's tipple.

Announcement is made that the offices of the Carr's Creek Coal Co. have been moved from Lexington to 224 First National Bank Bldg., Portsmouth, Ohio. The company operates in the Hazard field and is the third largest producer in that field. The company is capitalized at \$600,000 and has two operating mines. H. E. Bullock, of Lexington, is president; George E. Matthews, of Portsmouth, vice-president, and Joseph T. Micklethwaite, of Portsmouth, is secretary. Gilbert Monroe, of Portsmouth, is chairman of the board of directors.

A new 65-ft. oil-burning towboat, the "Pattie," is entering the Ohio-Kentucky River towing trade, to handle coal and oil between eastern Kentucky points on the Kentucky River and Louisville.

MISSOURI

Martinsburg Mine Leased.—Eli Bailey and A. D. Crawford, of Centerville, Iowa, have leased the Martinsburg Coal & Mining Co. property at Martinsburg for one and a half years with the privilege of purchase. Twenty men are now at work and a carload of new equipment will be required to bring the plant's capacity up to the desirable operating level. William Cowan, of Mystic, Iowa, is the new superintendent. The new firm will be known as the Martinsburg Coal Mining Co. The bed now being worked is from 2 to 4 ft. thick and 125 ft. deep.

The Mariott coal mine, west of Moberly, has resumed operations after being shut down for some time.

OHIO

The Freeport Collieries Co., chartered several months ago with a capital of \$10,000, has been organized by the election of Frederick A. Jones, president; S. D. Doney, vice-president; J. R. Elder, treasurer, and E. E. Learned, secretary. The company has taken over the Crab Orchard Mining Co., located near Freeport, in the Middle Ohio district. The capacity of the mine will be increased from time to time. The product is being sold through the Jones & Elder Coal Co., of Columbus.

PENNSYLVANIA

Nine Years for Engineers.—Hereafter nine years will be the minimum time in which the degree of engineer may be obtained from Lehigh University, according to an official statement by President Charles R. Richards. Beginning with the entering class next autumn the usual four-year course will lead to the degree of bachelor of science in the various branches of engineering, but five years of acceptable practical experience in responsible charge of work after graduation and the submission of a suitable thesis will be required before the university will stamp a candidate as a full-fledged mining, civil, mechanical, electrical or chemical engineer.

The Bessemer & Lake Erie R.R. reports several mines having reopened on its line between East Pittsburgh and Grove City. Some of these operations had been shut down for more than a year.

The Irvona Coal & Coke Co. has started operations at the company's mine at Blain City under the 1917 scale. Miners at work are being protected by state and coal and iron police. Striking miners are causing some trouble, but no serious outbreak has occurred. Two hundred strikers consulted with Attorney J. Mitchell Chase in Clearfield last week to see what could be done. They complained of the conduct of the police in keeping them from the mine property.

Seek New Valuation Plan.—Luzerne County Commissioners are seeking a newer and more modern method of valuing coal lands for taxation purposes than that now in vogue. To this end they are sending out a circular letter to owners of coal lands, controllers, solicitors and coal company officials, as well as civic bodies in the several anthracite counties, preliminary to calling a conference in Wilkes-Barre to discuss the problem. The commissioners declare that the present law, which was passed ninety years ago, requires an assessment on the "market value" of the coal and that it is an obsolete and unsatisfactory method. After practically every triennial assessment the coal companies have appealed from values fixed by the assessors, resulting in troublesome and lengthy litigation.

Scotch Run Breaker Burns.—The Scotch Run breaker of the Scotch Run Coal Co., located in Scotch Valley, near Hazleton, was destroyed by fire July

20, causing an estimated loss of \$150,000. The fire is believed to have started in an engine house and was discovered by repairmen on the breaker soon after operations ceased for the day. The breaker, which was rebuilt in 1924, had a capacity of 300 tons daily. Its destruction renders 150 men and boys idle. Work on rebuilding will begin at once, officials said.

The Punxiana Coal & Coke Co., of Indiana, has asked for a receivership to assist in tiding over an embarrassment that is stated to be merely temporary. Samuel T. Brown, of Indiana, has been appointed.

Coal Traffic Helps Lehigh Valley.—An increase of 19 per cent in coal loadings was partly responsible for the record high gross revenue which the Lehigh Valley R.R. will report for June. The figures are estimated around \$7,100,000, which compared with \$7,052,000 in June, 1923, the previous high mark. June, gross of \$7,100,000 will, according to estimates, be the fourth largest gross for any month. The record monthly gross was \$8,481,100, in October, 1920.

TENNESSEE

The Tennessee Products Corporation, representing a merger of the Chattanooga Coke & Gas Co., Bon Air Coal & Iron Co. and the J. J. Gray, Jr., properties to develop coal deposits on Waldens Ridge, is reported to be about to expend several million dollars for a battery of beehive coke ovens and the equipment that goes with them. John J. Immerfall, Nashville, is president and general manager of the company.

VIRGINIA

Great Valley Co. Breaks Ground.—Progress is being made toward the development of an extensive acreage of coal land in Montgomery and Pulaski counties. Ground has been broken at McCoy, in Montgomery County and at Belhampton, in Pulaski County. The operating company, known as the Great Valley Anthracite Corporation, with a capital stock of \$1,500,000 and a bond issue of \$1,000,000, has a long-term lease on about 5,000 acres. The coal is of the anthracite type and the beds are said to be from 7 to 9 ft. thick.

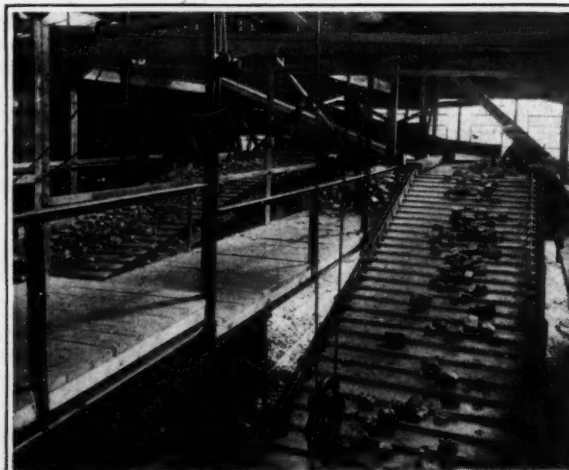
The McCoy operation will be reached by the Virginian Ry. The mine at Belhampton will be served by the Norfolk & Western. E. C. Searls, of Chicago, is president of the company. Cumberland and Baltimore people for the most part are interested in the new company.

Clinchfield on Full Time.—The Clinchfield Coal Corporation has started full-time operation at all of its mines in Russell and Dickenson counties. Several hundred additional workmen will be afforded employment by the resumption. The company operates nine large mines at Dante, Wilder and Clinchco. The three mines at Clinchco and one of the Dante mines have lost no time on account of market conditions, but at the remaining mines production has been somewhat curtailed due to the demand falling off.

WEST VIRGINIA

Consolidation to Hire 2,000.—The Consolidation Coal Co. is preparing to give employment to at least 2,000 additional men in the mines operated in the Fairmont region, according to a recent announcement made by C. W. Watson, president. Early this year Consolidation officials announced that that company would endeavor to speed production, and its loadings in the region this summer have been unusually large.

Ask Assessment Cut.—A reduction of \$5,000,000 on the assessment of 26,000 acres of coal lands in Monongalia County has been asked by James A. Paisley, of Cleveland, who appeared recently before the Monongalia County Board of Equalization and Review. Coal property owned outright and under lease by Mr. Paisley is assessed at \$6,819,515 by the county and the valuation fixed by Mr. Paisley is \$1,809,186. Samuel Pursglove, president and general manager of the Cleveland-Morgantown Coal Co. and the Pursglove Coal Mining Co., operating in Monongalia County, sought a flat valuation of \$35 an acre on his 3,200 acres of coal lands in that county. The Pursglove coal, the Sewickley vein, is now assessed at a graduated valuation of from \$35 to \$75 an acre. In asking a reduction, Mr. Pursglove declared that a large percentage of the Sewickley coal is practically worthless be-

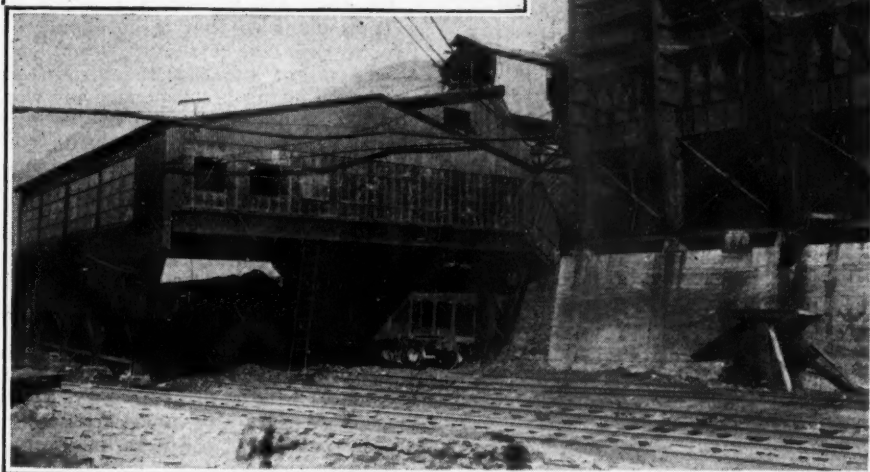


**Interior
Manufacturers'
Coal & Coke
Tippie**

The photograph is a snapshot made without artificial light. The glazed roof and sides make this tippie one of the best lighted in the country. It contains Jeffrey equipment, and was designed and built by engineers of the parent company, the Peabody Coal Co. The location is at Manco, on Marrowbone Creek, in eastern Kentucky.

New Tipple of Peabody Interests at Manco, Ky.

This three-track steel tipple of the Manufacturers Coal & Coke Co. was completed in February of this year. It was designed and erected by the Peabody organization. Note that practically all of the side area of the picking room is glazed. The steel bin at the left, which has a capacity of 1,500 tons, was erected several years ago for use in connection with the coke ovens.



cause it is doubtful if it can be mined after the Pittsburgh coal underneath has been removed. Twenty-five dollars was the actual value that he placed upon the property. The tract affected is two miles from a railroad, and it is estimated that it will not be needed for mining for 50 years. After spending two days in investigation of the claims advanced, the board declined to grant the reduction and adjourned until July 30, when a final and official decision will be announced.

The Sitnek Coal Mining Co. has changed its name to the Katherine Coal Mining Co. The operation is near Lumberport, Harrison County. The company's main office is in Philadelphia, Pa.

State Output Climbing.—Robert M. Lambie, chief of the state Department of Mines, estimates that the coal production in the state for the first six months of the year approximates 60,000,000 net tons, an increase of 7,000,000 tons over the corresponding period of 1925. The last six months of 1925 were heavier than the first six months due to the anthracite strike. The probabilities are that the last six months of this year will be heavier than the first six months, especially if the British strike continues.

Assessment of public utilities of West Virginia by the state Board of Public Works for 1926 show that a total of \$477,916,634, an increase of \$16,864,158 compared to last year. The assessments against the principal coal carriers of the state are as follows: Baltimore & Ohio, \$97,500,000, which is the largest taxpayer in the state; Norfolk & Western, \$50,400,000; Chesapeake & Ohio, \$50,000,000; Western Maryland, \$9,750,000.

To Sink New Slope.—Plans have been made by the American Rolling Mills Co., of Middletown, Ohio, and Ashland, Ky., to sink a new 600 ft. slope on its

property at McNellis, Boone County, on Aug. 1, according to reports. The company already has plants at McNellis.

The following West Virginia coal concerns have been dissolved: Buckhannon Fuel Co., Wilsondale Coal Co., Randall Coal Co., Pringle Run Coal Co., State Coal Co., Braxton Fuel Co., Inc., Greenview Coal Co. and Crane Fuel Co.

Another Big Producer Going In.—The Island Creek Coal Co., of Holden, is planning to increase its output materially by adding a new shaft mine to its Logan County group. The plant probably will have an 8-hour capacity of 6,000 tons with shafts about 750 ft. deep.

The tipple of the Keely Coal Co. near Wilsonburg, Harrison County, was completely destroyed by fire early in the morning of July 10. Indications are that the blaze was of incendiary origin. Not only was the tipple destroyed but the carrier cable connecting pit mouth and tipple also was partly destroyed. The mine has not been in operation for some time and the place was deserted.

The Margarette Coal Co., of Marquette, Greenbrier County, is removing its offices from Huntington to Marquette, according to reports.

Coal River Has Safety Meet.—Three hundred and fifty persons attended the safety meeting held by the Coal River Collieries Co. in the amusement building at Prenter, Boone County, on July 19. Addresses were made by J. T. Dunningan, president; C. E. Sanberg, general superintendent; William Schuster, superintendent of the company; R. E. Richards, superintendent of the Opperman Coal Co.; H. I. Connor, district mine inspector, and C. O. Morris, safety director of the state Department of Mines. The film, "Coal—the Principal Source of Power" was shown. The company is taking a deep interest in the observance of Mine Safety Day in Huntington on Aug. 21, and plans to

take 400 persons from the town to Huntington that day. A benefit motion picture show was given on July 23 in order to raise money to defray the expense of sending two safety teams to Huntington to participate in the first-aid and mine-rescue events incident of Mine Safety Day.

More Fines for Careless Miners.—Meido Falone, a coal loader, and J. D. Liptrap, a miner, both employed by the Cannellton Coal & Coke Co., at Handley, Kanawha County, were fined heavily for violating the mining laws, according to a report issued by the state Department of Mines on July 14. Falone was accused of shooting coal down without cleaning up the bugdust in his working place, and Liptrap was charged with short-fusing.

CANADA

Urge Water Carriage.—A deputation comprising representatives of the Owen Sound (Ont.) City Council, Board of Trade and coal business, on July 8 waited on Premier Ferguson, of Ontario, to urge that representations be made to the federal government to the effect that an appreciable reduction in the cost of the transportation of Alberta coal to Ontario could be effected by water carriage. It was stated that by shipping Alberta coal by water the price in Ontario would be \$11.50 a ton, whereas under the train haulage arrangements that prevailed last winter the cost was about \$15.

The Crow's Nest Pass Coal Co., Ltd., of Fernie, B. C., showed a considerable increase in its earnings for 1925, according to the annual report. The total profits were \$378,913, as compared with a loss of \$257,939 for the preceding year. The balance in credit and loss account as of Jan. 1, 1925, was \$252,178, and the addition of the year's profits brought the total to \$631,092.

Output and Value of Coke Up.—Production of coke in Canada during 1925 totaled 1,779,871 tons, according to a revised statement just issued by the Dominion Bureau of Statistics. Of the total output, 1,110,710 tons was made in plants producing metallurgical coke as the chief product, 625,973 tons was produced as a byproduct from gas plants and 43,188 tons of petroleum coke was recovered from oil refineries. In 1924, the total production of coke in Canada was 1,486,237 tons. The six plants in the coke industry, representing a capital investment of nearly \$24,000,000, employed 583 persons during the year and paid out \$885,637 in salaries and wages. Materials worth \$7,112,311 were converted into products having a selling value of \$11,193,453. In 1924 the same plants had an output valued at \$10,438,462. Of the six plants, three were located in Ontario, two in British Columbia and one in Nova Scotia.

In order to bring its mine up to a capacity of 2,000 tons per day, the Alberta Canadian Collieries, Ltd., is selling a \$100,000 bond issue through H. S. Hegler, Ltd., of Edmonton. The capitalization of the company consists of 3,000 shares of \$100 par value.

Among the Coal Men

Michael Gallagher, who has been general manager of the bituminous coal mining department of the M. A. Hanna Co., Cleveland, Ohio, for the last eighteen years, has handed in his resignation, to take effect Aug. 1, and will become associated with the Van Sweringen brothers. Mr. Gallagher will retain his interest in the Hanna company and continue as a member of its board of directors.

Thomas Downing, Jr., formerly general manager of the Logan Coal Corporation but now connected with the D'Inwilliers Co., of Philadelphia, was a business visitor to Charleston, W. Va., recently.

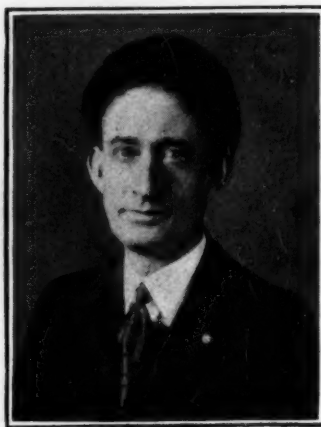
Prof. Howard Eckfeldt, head of the mining engineering department at Lehigh University, South Bethlehem, Pa., recently toured southern West Virginia, where he inspected the Shamokin mine of the Pocahontas Fuel Co. at Switchback, McDowell County, and the mine of the American Coal Co. at McComas, Mercer County. While in Bluefield he attended the sessions of the West Virginia Mining Institute. His tour also included a visit to the Nemacolin mine of the Youngstown Sheet & Tube Co., in southwestern Pennsylvania, and Frick plants in the coke belt. Professor Eckfeldt expected to be in the Clearfield section of central Pennsylvania this week to inspect mines of the Berwind-White Coal Mining Co. and of Peale, Peacock & Kerr. Improved methods in the bituminous fields will be incorporated in the course at Lehigh, according to Professor Eckfeldt.

William A. Staab, assistant professor of mining engineering of the University of West Virginia, is making a study of the mining conditions in West Virginia. He will do considerable work in southern West Virginia and his first activities will start in the New River field, with headquarters at Mount Hope.

Prof. C. E. Lawall, who is in charge of the mining engineering department at the University of West Virginia, Morgantown, W. Va., has appointed **Adam Crawford**, assistant director of the mining extension department of W. V. U., and **J. S. Poundstone, J. H. Haskell** and **Hobart Watson**, of the extension department, to represent the institution at the observance of safety day at Huntington on Aug. 21. They will act as officials at the meet.

P. A. Coen, president of the Big Mountain Coal Co., Columbus, Ohio, left July 12 on a two weeks' business and vacation trip to Detroit, Toledo, Chicago and the Northwest. He expects to spend some time fishing in Michigan.

Prof. A. G. Leonard, **Prof. A. G. Boyd** and **Prof. Leonard A. Dove**, members of the faculty of the University of North Dakota, will spend the summer in experimental work in the lignite fields of that state. Efforts are being made to utilize weathered oxidized lignite for making dyes. The Dakalite Co. is sponsoring the investigations.



Daniel Harrington

Daniel Harrington, consulting engineer, of Salt Lake City, Utah, will assume the duties of chief engineer of the safety service of the U. S. Bureau of Mines on Aug. 1. Mr. Harrington is a native of Denver and was graduated from the Colorado School of Mines in 1900. He served as chief engineer of the Utah Fuel Co. and as superintendent of the Big Horn Collieries Co., Crosby, Wyo. In 1914 he entered the service of the Bureau of Mines as mining engineer, and in 1920 was made supervising mining engineer of the Bureau, from which office he resigned in 1924 to take up private work in Salt Lake City. A new branch of the Bureau will be created Aug. 1, known as "Safety and Health," and Dr. R. R. Sayers, chief surgeon of the Bureau and in charge of the safety work since the resignation of Dr. T. T. Read, last March, will be in charge of this branch, with supervision over the work of Mr. Harrington.

Obituary

W. A. Roebling, Builder of Brooklyn Bridge, Dies

Colonel Washington A. Roebling, 89 years old, builder of the Brooklyn Bridge and president of the J. A. Roebling's Sons Co., Trenton, N. J., died at his home in that city, July 21, from infirmities of old age.

Colonel Roebling is best known as the builder of the Brooklyn Bridge, which when it was completed in 1883 was the longest suspension bridge in the world.

The death of his father, John A. Roebling, of lockjaw, as the result of an injury suffered while making a survey at the Brooklyn side of the river, threw the burden of the construction on the son. No construction had been done and the plans were general in character.

The son went to Europe and studied pneumatic foundations before undertaking sinking of the foundations for the structure. He took up his residence

in Brooklyn and during the sinking of caissons never left that borough for an hour. He personally supervised all important preliminary work. He was on the scene of operations night and day.

His health was impaired in December, 1872, and he had to cease his visits, but he maintained personal supervision from a wheel chair on the roof of his home, watching progress through powerful field glasses.

He spent the winter in drawing and writing plans so that if he should not live to see the structure completed, others might finish the job. In the spring following he suspended his work entirely at the insistence of his physicians, and spent six months in Germany. Upon his return he resumed personal supervision.

He served in the Civil War and received three brevets for gallant conduct, including that of Colonel. He served for a year with the 6th New York Artillery and for the remainder of the war did staff duty. He was on duty at General Headquarters during the Battle of Chancellorsville and each morning ascended in a balloon to reconnoiter. On one occasion he was the first to discover that Gen. Lee was moving on Gettysburg.

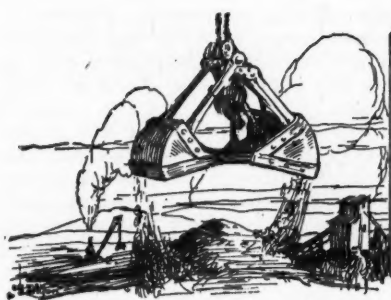
Resigning in January, 1865, he went to Cincinnati to assist his father in completion of the Cincinnati and Covington Bridge.

Since the completion of the Brooklyn Bridge he had devoted his time to direction of a wire manufacturing business in Trenton.

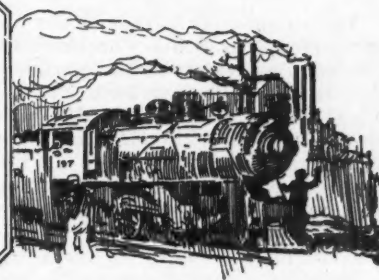
Col. Roebling was born in Saxonburg, Pa., and was graduated as a civil engineer from the Rensselaer Polytechnic Institute at Troy, N. Y., in 1857. As assistant to his father, his first engineering work was done on the Allegheny suspension bridge.

D. E. Spangler, general superintendent of transportation, Norfolk & Western Ry., died suddenly at Atlantic City, N. J., on July 22. "Dad," as Mr. Spangler was affectionately known to hundreds of coal men, had gone to the Jersey resort to attend the lake cargo rate hearings before the Interstate Commerce Commission. He was stricken with a heart attack as he was dressing for breakfast. Mr. Spangler started his railroad career as a telegraph operator in Ohio. One of his "buddies" in those days was W. K. Field, now president of the Pittsburgh Coal Co. "Dad" was with the N. & W. for forty years and was recognized as one of the best operating men in the country. He was in his sixty-fourth year. Funeral services were held at Roanoke, Va., on Friday. The remains were taken to Circleville, Ohio, for interment.

Walter Roslyn Chambers, retired mining engineer, died at Cumberland, Md., July 22, aged 100 years. He passed the century mark on April 28. Mr. Chambers received his engineering education at Manchester, England, working his way through Owens College. He helped to sink several large shafts at Hoylan, in the Yorkshire coal fields, and saw service with the First Lincolnshire Volunteer Corps in the Crimean War (1853-1856). He came to America in 1879 and helped to develop the West Virginia coal fields. His wife and two grandsons survive.



Production And the Market



Soft-Coal Market Shows Moderate Improvement; Export Trade Maintains Gains

Further modest progress along the road to improvement was achieved by the bituminous coal markets of the country last week. Production, after the quick recovery from the holiday slump, held its gains. Exports and lake loadings added substantial quotas to current demand and there were unmistakable evidences of a broadening general market for coal. Prices, too, showed greater firmness.

Output for the week ended July 17 is estimated by the U. S. Bureau of Mines at 10,131,000 net tons. For the corresponding week last year the figure was 8,965,000 tons and in 1924 it was 7,644,000 tons. The 1923 figure tops the current output by only 912,000 tons. The cumulative production to date, 290,304,000 tons, is 15,249,000 tons behind the 1923 record, but exceeds the figures for all other post-war years.

The export trade is giving a good account of itself. During the past week over 450,000 net tons destined to the United Kingdom were cleared from Baltimore and Hampton Roads. These figures, of course, do not include the gains which may be chalked up to the credit of our overseas movements to other countries. Nor is the lake business a laggard. During the week ended July 25 dumpings at the Lake Erie ports were 945,299 tons of cargo and 50,537 tons of vessel fuel. This brings the season's total to 13,651,470 tons, compared with 11,412,323 tons in 1925 and 9,578,666 tons in 1924.

Spot Quotations Move Upward

Coal Age Index of spot bituminous prices was 159 on July 26 and the corresponding price was \$1.92. Compared to the figures a week earlier, this was an advance of 2c. and two points. The end of July, 1923, saw an index figure of 196 and a weighted average price of \$2.37. It is plain, therefore, that the road to the realiza-

tions of former years is a long one. The prospects that there will be any repetition of 1920 are too remote for consideration.

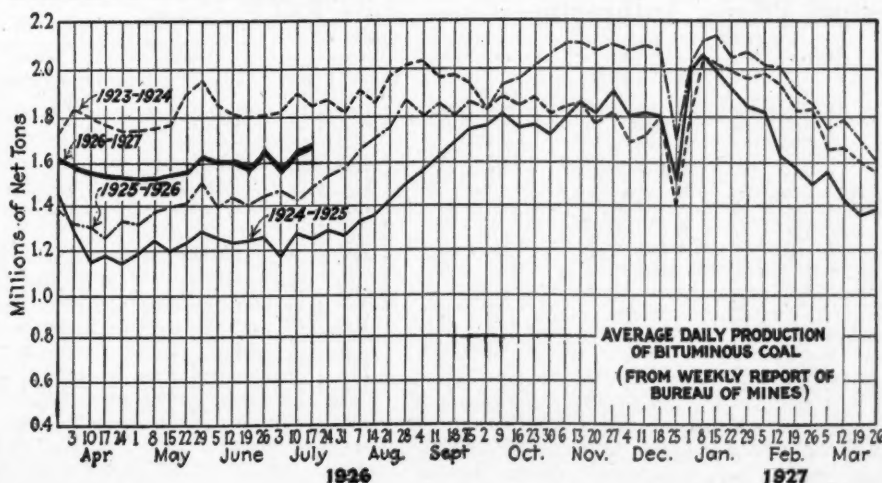
A survey of the price changes responsible for the increase in the index number shows an unexpected jump in West Virginia low-volatile quotations at Boston, with other low-volatiles fluctuating slightly or not at all; higher inland prices on West Virginia high-volatiles and coals from eastern Kentucky. Slack from the No. 8 field also advanced. Western Kentucky was easier. Indiana shippers raised prices on domestic sizes.

Anthracite Situation Unsettled

If the anthracite situation is considered from a statistical standpoint, the outlook is indeed promising. If the analysis is based upon current market reports, there is less cause for rejoicing. Cumulative production to July 17 had narrowed the gap between calendar year output in 1926 and 1925 to 7,797,000 net tons. On the coal-year basis, on the other hand, current output was approximately 3,135,000 tons ahead of 1924-25.

Pure comparisons undoubtedly favor the present coal year. The unknown factor is the tonnage consumed since April 1. In a general way it is known that the consumption, because of weather conditions, was considerable. Producers are inclined to estimate it highly and therefore to view the present slack demand as forecasting difficulties in meeting requirements later in the season. Householders, however, exhibit no alarm.

The Connellsville coke trade staged a price comeback on small lots of furnace coke last week, but orders for larger amounts were readily accepted at the \$2.75@ \$2.85 basis. There are some producers in that region who are looking toward broader markets for raw coal to insure their future.



Estimates of Production

(Net Tons)

BITUMINOUS

	1925	1926
July 3	7,351,000	9,490,000
July 10 (a)	8,639,000	8,306,000
July 17 (b)	8,965,000	10,131,000
Daily average	1,494,000	1,689,000
Cal. yr. to date	(c) 254,611,000	290,304,000
Daily av. to date	1,523,000	1,736,000

ANTHRACITE

July 3	1,477,000	1,970,000
July 10	1,809,000	1,545,000
July 17	1,936,000	1,979,000
Cal. yr. to date	(c) 48,473,000	40,676,000

BEEHIVE COKE

July 10 (a)	129,000	176,000
July 17 (b)	127,000	181,000
Cal. yr. to date	(c) 5,564,000	7,059,000

(a) Revised since last report. (b) Subject to revision. (c) Adjusted to equalize number of days in the two years.

Steam Coals Hold Gains

The steam coal market in the Middle West continues firm. Purchases in the Chicago district are substantial, but the potential surplus available checks any sharp increases in price. At the same time, there is little price cutting and practically no distress lots. With the gradual expansion in domestic buying that will develop in the late summer and fall, there is no danger of any scarcity in the supply of screenings.

This latter buying already has started in a moderate way. The recent announcement of increased prices for Franklin County, effective next Monday, has been followed by similar notices from other fields. These have spurred sluggish buyers to action. Neither this buying pressure nor the steam business, however, has been strong enough to raise the rate of output materially at the Illinois and Indiana mines. Between stripping operations in their own fields and non-union tonnage from western Kentucky, the

shaft mines find the competitive struggle a bitter one.

The position of Eastern coals in the Chicago market also has improved. High-volatile mine-run is scarce. Most of the West Virginia coal, apparently, is moving to tidewater, so that eastern Kentucky has little competition except from its own shippers. Smokeless, too, is stronger and prices on lump are firmer. There is little demand for Eastern coal in St. Louis territory. Some storage orders are being placed with southern Illinois, but domestic stocking is backward. In the country towns served out of St. Louis resentment over increased prices runs high.

Kentucky Movement Broadens

Buying of eastern Kentucky coal has broadened to a marked degree. Some of the mines in the gas-coal districts are booked to Aug. 15 and decline to accept further orders at present prices. Export movement has lightened the competition from West Virginia in the

Middle West; somnolent purchasers have been aroused by higher prices; the lakes are demanding more coal and retailers are beginning to build up storage piles.

In the western part of the state, however, there has been no real improvement, although business is ahead of last year. Some extra choice block is bringing \$2, but most of the western Kentucky block is selling at \$1.50@ \$1.75 and the same range controls lump and egg, with nut 10@15c. less. Mine-run is \$1.10@ \$1.40 and screenings hang at 80@90c. Eastern Kentucky block has advanced to \$2.25@ \$2.50; lump and egg, \$2@ \$2.25; nut, \$1.75@ \$2. Mine-run is \$1.40@ \$1.75. Slack is \$1.10@ \$1.20.

The greater steadiness in dock quotations has encouraged some consumers to place deferred orders with shippers at the Head of the Lakes. A number of municipal contracts also are pending. Railroads are taking advantage of the lull in general traffic to increase their

Current Quotations—Spot Prices. Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern		Market Quoted	July 27 1925	July 12 1926	July 19 1926	July 26 1926†	Midwest		Market Quoted	July 27 1925	July 12 1926	July 19 1926	July 26 1926†
Smokeless lump.....	Columbus....		\$2.85	\$3.10	\$3.10	\$3.00@ \$3.25	Franklin, Ill. lump.....	Chicago.....	\$2.60	\$2.75	\$2.75	\$2.75	
Smokeless mine run.....	Columbus....		1.85	2.10	2.10	2.00@ 2.25	Franklin, Ill. mine run....	Chicago.....	2.35	2.35	2.35	2.25@ 2.50	
Smokeless screenings.....	Columbus....		1.35	1.25	1.30	1.60@ 1.55	Franklin, Ill. screenings...	Chicago.....	2.00	1.80	1.80	1.65@ 2.00	
Smokeless lump.....	Chicago.....		3.10	3.00	3.00	3.00@ 3.25	Central, Ill. lump.....	Chicago.....	2.35	2.40	2.40	2.35@ 2.50	
Smokeless mine run.....	Chicago.....		2.00	1.90	1.90	1.85@ 2.00	Central, Ill. mine run....	Chicago.....	2.10	2.10	2.10	2.00@ 2.25	
Smokeless lump.....	Cincinnati...		2.85	3.10	3.10	3.00@ 3.25	Central, Ill. screenings...	Chicago.....	1.70	1.50	1.50	1.40@ 1.60	
Smokeless mine run.....	Cincinnati...		2.00	2.00	2.00	2.00	Ind. 4th Vein lump.....	Chicago.....	2.60	2.40	2.40	2.50@ 2.75	
Smokeless screenings.....	Cincinnati...		1.30	1.30	1.35	1.25@ 1.50	Ind. 4th Vein mine run....	Chicago.....	2.35	2.15	2.15	2.10@ 2.25	
*Smokeless mine run.....	Boston.....		4.35	4.40	4.35	4.55@ 4.70	Ind. 4th Vein screenings...	Chicago.....	1.80	1.75	1.75	1.65@ 1.85	
Clearfield mine run.....	Boston.....		1.80	1.80	1.75	1.65@ 1.90	Ind. 5th Vein lump.....	Chicago.....	2.25	2.15	2.15	2.25@ 2.50	
Cambria mine run.....	Boston.....		1.95	2.10	2.00	1.90@ 2.15	Ind. 5th Vein mine run....	Chicago.....	1.95	1.95	1.95	1.85@ 2.10	
Somerset mine run.....	Boston.....		1.85	1.90	1.85	1.75@ 2.00	Ind. 5th Vein screenings...	Chicago.....	1.50	1.50	1.50	1.40@ 1.60	
Pool 1 (Navy Standard)...	New York....		2.55	2.60	2.60	2.50@ 2.75	Mt. Olive lump.....	St. Louis....	2.50	2.35	2.35	2.25@ 2.50	
Pool 1 (Navy Standard)...	Philadelphia..		2.60	2.65	2.65	2.50@ 2.80	Mt. Olive mine run....	St. Louis....	2.25	2.15	2.15	2.15	
Pool 1 (Navy Standard)...	Baltimore....		1.85	2.10	2.15	2.15@ 2.20	Mt. Olive screenings...	St. Louis....	1.75	1.55	1.55	1.50@ 1.60	
Pool 9 (Super. Low Vol.)...	New York....		1.95	2.10	2.05	1.90@ 2.25	Standard lump.....	St. Louis....	2.25	2.25	2.25	2.25	
Pool 9 (Super. Low Vol.)...	Philadelphia..		2.00	2.10	2.10	2.00@ 2.25	Standard mine run....	St. Louis....	1.80	1.80	1.80	1.75@ 1.85	
Pool 9 (Super. Low Vol.)...	Baltimore....		1.75	1.80	1.85	1.80@ 1.90	Standard screenings...	St. Louis....	1.30	1.35	1.35	1.25@ 1.50	
Pool 10 (H.Gr.Low Vol.)...	New York....		1.80	1.85	1.85	1.75@ 2.00	West Ky. block.....	Louisville...	1.65	1.70	1.75	1.60@ 1.75	
Pool 10 (H.Gr.Low Vol.)...	Philadelphia..		1.70	1.85	1.85	1.75@ 2.00	West Ky. mine run....	Louisville...	1.15	1.15	1.25	1.10@ 1.40	
Pool 10 (H.Gr.Low Vol.)...	Baltimore....		1.60	1.65	1.75	1.75@ 1.80	West Ky. screenings...	Louisville...	.85	.85	.85	.80@ .90	
Pool 11 (Low Vol.).....	New York....		1.55	1.70	1.70	1.60@ 1.85	West Ky. block.....	Chicago.....	1.90	1.75	1.75	1.65@ 1.85	
Pool 11 (Low Vol.).....	Philadelphia..		1.55	1.55	1.55	1.45@ 1.70	West Ky. mine run....	Chicago.....	1.35	1.15	1.15	1.00@ 1.35	
Pool 11 (Low Vol.).....	Baltimore....		1.40	1.60	1.65	1.65@ 1.70							

High-Volatile, Eastern		Market Quoted	July 27 1925	July 12 1926	July 19 1926	July 26 1926†	South and Southwest		Market Quoted	July 27 1925	July 12 1926	July 19 1926	July 26 1926†
Pool 54-64 (Gas and St.)...	New York....		1.50	1.40	1.40	1.35@ 1.50	Big Seam lump.....	Birmingham..	2.00	2.45	2.45	2.80@ 2.70	
Pool 54-64 (Gas and St.)...	Philadelphia..		1.50	1.45	1.45	1.40@ 1.55	Big Seam mine run....	Birmingham..	1.75	1.85	2.00	1.75@ 2.00	
Pool 54-64 (Gas and St.)...	Baltimore....		1.35	1.45	1.45	1.45@ 1.50	Big Seam (washed).....	Birmingham..	1.85	2.00	2.00	1.75@ 2.25	
Pittsburgh sc'd gas.....	Pittsburgh...		2.40	2.25	2.25	2.20@ 2.30	S. E. Ky. block.....	Chicago.....	2.55	2.40	2.40	2.10@ 2.25	
Pittsburgh gas mine run...	Pittsburgh...		2.15	2.00	2.00	1.90@ 2.10	S. E. Ky. mine run....	Chicago.....	1.70	1.55	1.55	1.50@ 1.75	
Pittsburgh mine run (St.)...	Pittsburgh...		1.95	1.75	1.75	1.60@ 1.90	S. E. Ky. block.....	Louisville...	2.25	2.10	2.25	2.25@ 2.50	
Pittsburgh slack (Gas)...	Pittsburgh...		1.50	1.25	1.25	1.20@ 1.30	S. E. Ky. mine run....	Louisville...	1.55	1.50	1.45	1.40@ 1.75	
Kanawha lump.....	Columbus....		2.00	2.05	2.05	1.85@ 2.25	S. E. Ky. screenings...	Louisville...	1.10	1.05	1.05	1.00@ 1.20	
Kanawha mine run.....	Columbus....		1.40	1.55	1.55	1.50@ 1.75	S. E. Ky. block.....	Cincinnati...	2.35	2.15	2.20	2.30@ 2.50	
Kanawha screenings.....	Columbus....		1.15	1.05	1.05	1.00@ 1.15	S. E. Ky. mine run....	Cincinnati...	1.45	1.50	1.55	1.35@ 1.65	
W. Va. lump.....	Cincinnati...		2.25	2.25	2.25	2.25@ 2.50	S. E. Ky. screenings...	Cincinnati...	1.15	1.15	1.10	1.00@ 1.25	
W. Va. gas mine run....	Cincinnati...		1.40	1.60	1.65	1.60@ 1.85	Kansas lump.....	Kansas City..	4.00	4.00	4.00	4.00	
W. Va. steam mine run....	Cincinnati...		1.30	1.40	1.50	1.40@ 1.60	Kansas mine run....	Kansas City..	3.00	3.00	3.00	3.00	
W. Va. screenings.....	Cincinnati...		1.15	1.10	1.10	1.10@ 1.25	Kansas screenings...	Kansas City..	2.50	2.40	2.40	2.50	
Hooking lump.....	Columbus....		2.15	2.35	2.35	2.25@ 2.50							
Hooking mine run.....	Columbus....		1.55	1.55	1.55	1.40@ 1.70							
Hooking screenings.....	Columbus....		1.35	1.10	1.10	1.00@ 1.25							
Pitta. No. 8 lump.....	Cleveland....		2.25	2.15	2.15	1.80@ 2.50							
Pitta. No. 8 mine run....	Cleveland....		1.90	1.65	1.75	1.70@ 1.80							
Pitta. No. 8 screenings...	Cleveland....		1.40	1.15	1.20	1.25@ 1.35							

* Gross tons, f.o.b. vessel, Hampton Roads
† Advances over previous week shown in heavy type, declines in italics

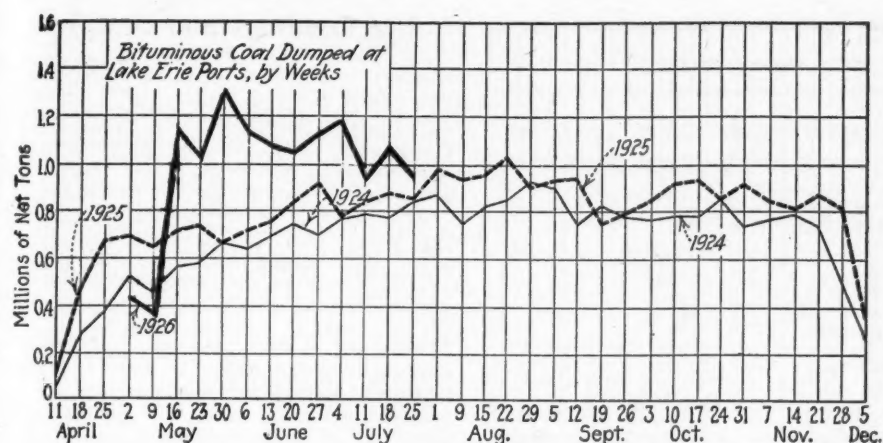
* Gross tons, f.o.b. vessel, Hampton Roads

† Advances over previous week shown in heavy type, declines in italics

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Market Quoted	Freight Rates	July 27, 1925		July 19, 1926		July 26, 1926†	
				Independent	Company	Independent	Company	Independent	Company
Broken.....	New York....		\$2.34		\$8.15@ \$8.80		\$8.50@ \$9.25		\$8.50@ \$9.25
Broken.....	Philadelphia..		2.39		8.70		8.50@ 9.15		8.50@ 9.15
Egg.....	New York....		2.34	\$8.75@ \$9.10	8.55@ 8.80	\$9.25	8.50@ 9.15	\$9.25	8.50@ 9.15
Egg.....	Philadelphia..		2.39	8.80@ 9.40	8.60@ 8.80	8.50@ 9.00	8.75@ 9.25	8.60@ 9.00	8.75@ 9.25
Egg.....	Chicago.....		5.06	7.86@ 8.60	7.54@ 8.28	9.00@ 9.75	9.00@ 9.15	9.00@ 9.75	9.00@ 9.15
Stove.....	New York....		2.34	9.25@ 9.75	9.05@ 9.30	9.25@ 9.60	9.25@ 9.50	9.00@ 9.60	9.25@ 9.50
Stove.....	Philadelphia..		2.39	9.40@ 9.75	9.05@ 9.20	9.15@ 10.20	9.35@ 9.50	9.15@ 10.20	9.35@ 9.50
Stove.....	Chicago.....		5.06	8.22@ 8.70	8.32@ 8.80	8.84	8.33@ 8.58	8.84	8.33@ 8.58
Chestnut.....	New York....		2.34	8.75@ 9.10	8.55@ 8.80	8.25@ 8.75	8.75@ 9.15	8.25@ 8.75	8.75@ 9.15
Chestnut.....	Philadelphia..		2.39	8.80@ 9.65	8.70@ 8.80	8.50@ 9.75	9.00@ 9.15	8.50@ 9.75	9.00@ 9.15
Chestnut.....	Chicago.....		5.06	8.24@ 8.45	7.79@ 8.10	8.71	8.38@ 8.53	8.71	8.33@ 8.53
Pea.....	New York....		2.22	5.25@ 5.50	5.00@ 5.80	6.00@ 6.50	6.00@ 6.50	6.00@ 6.50	6.00@ 6.50
Pea.....	Philadelphia..		2.14	5.50@ 5.75	5.00@ 5.40	6.00@ 6.75	6.00@ 6.50	6.00@ 6.75	6.00@ 6.50
Pea.....	Chicago.....		4.79	4.91@ 5.36	4.91@ 5.36	6.03	5.65@ 5.80	6.03	5.65@ 5.80
Buckwheat No. 1.....	New York....		2.22	2.00@ 2.50	2.50	1.50@ 2.25	3.00@ 3.50	1.60@ 2.25	3.00@ 3.50
Buckwheat No. 1.....	Philadelphia..		2.14	2.15@ 2.75	2.50	1.85@ 2.50	2.25@ 2.75	1.85@ 2.50	2.25@ 2.75
Rice.....	New York....		2.22	1.90@ 2.00	2.00	1.25@ 1.85	2.00@ 2.25	1.25@ 1.85	2.00@ 2.25
Rice.....	Philadelphia..		2.14	1.85@ 2.00	2.00	1.45@ 2.00	1.75@ 2.25	1.50@ 2.00	1.75@ 2.25
Barley.....	New York....		2.22	1.35@ 1.60	1.50@ 1.60	1.25@ 1.75	1.75@ 2.25	1.25@ 1.60	1.75@ 2.25
Barley.....	Philadelphia..		2.14	1.40@ 1.50	1.50	1.25@ 1.75	1.50@ 1.75	1.25@ 1.75	1.50@ 1.75
Birdseye.....	New York....		2.22	1.40@ 1.60	1.60	.75@ 1.50	2.00	.75@ 1.50	2.00

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type; declines in italics.



storage at division points over the Northwest. Some progress has been made in winning back central and southern Minnesota business from Illinois and Indiana mines.

Smokeless Cuts Into Market

Demand for smokeless coal as a substitute for anthracite is growing. Lump is firm at \$7, stove at \$6.75 and screenings at \$4.25. Dock men again are revising their estimates of the hard coal tonnage required—downward. In some cases, it is reported, orders have been sent to the mines to curtail shipments until a more accurate survey of possible demand can be made. Receipts of bituminous from the lower ports are heavy.

Buying at the Twin Cities still is slow. The cut-price furore is subsiding and the trend is slightly upward. Harvesting of the crops has started; if the returns average well, a better movement of industrial coal is expected. Milwaukee dock operators declare they are well satisfied with the present distribution to Western points. Anthracite demand is larger notwithstanding the fact that many consumers forced to low-volatile during the last strike will continue to use semi-bituminous coal.

In the Southwest, the outlook is as bright as it has been for several months. The big Kansas wheat crop is keeping up a steady demand for nut coal for threshing, but there is no rush to lay in supplies of fuel for domestic purposes. Arkansas semi-anthracite mines in the Spadra field are running full time to take care of orders for lump at \$7. Paris lump is selling at \$6.50. Most of the shaft semi-anthracite is moving at \$5.50@6, with strip pit coal as low as \$4.50. Most of the other Oklahoma fields are working on a fairly satisfactory basis.

Colorado Domestic Market Slumps

Colorado operators are glum over the falling off in demand for domestic coals. Consumers in the agricultural regions are too busy with crops to be concerned about coal supplies and the retailer is reluctant to carry the storage load, although stocks in Kansas, Nebraska and Texas are said to be unusually low. For this reason a brisk movement is expected next month. Steam trade is well maintained by the buying for current consumption and storage.

Walsenburg and Canon City domestic lump are quoted at \$5; nut, \$4.75; chestnut and pea, \$3. Trinidad domestic lump and nut bring \$3.05; fancy

chestnut, \$3. Crested Butte bituminous lump is \$5; nut, \$4.75; choice Crested Butte anthracite is held at \$8@8.50. Slack is offered at 50c.@\$1. Kemmerer and Rock Springs lump, nut and grate are \$3.40, with steam prices the same as on Colorado coals.

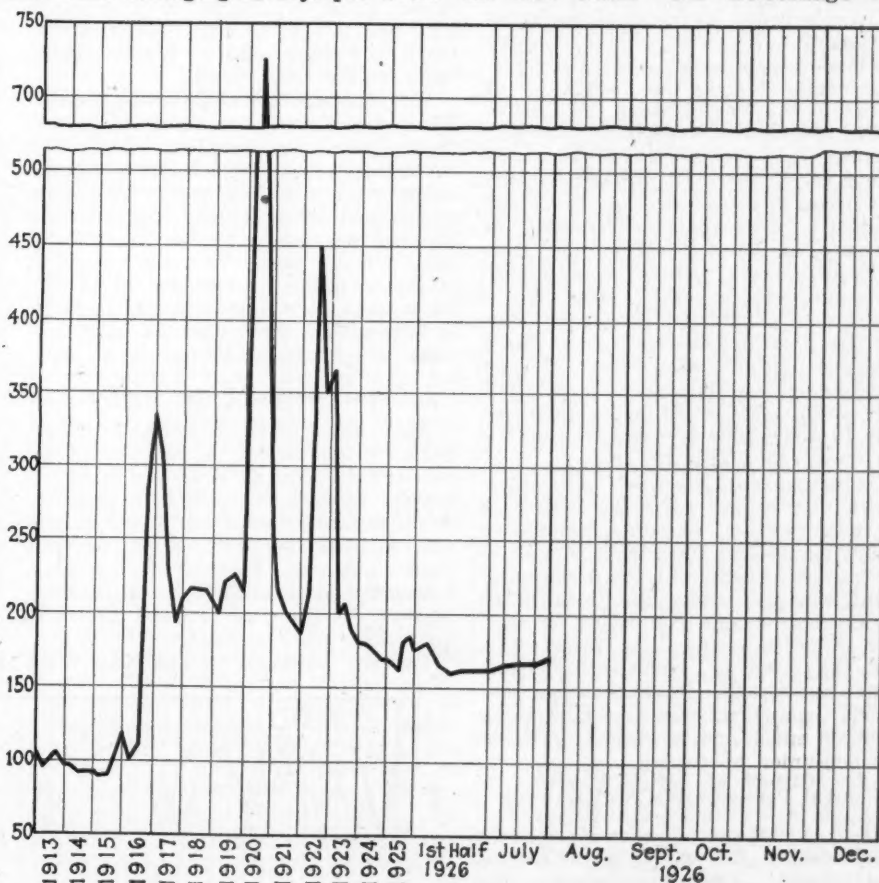
In Utah the demand for domestic coal is steadily dwindling. This makes it impossible to accumulate a surplus of screenings. Any early advance in prices on the coarse coal, therefore, does not seem likely. Operators fear increases would only further diminish domestic demand and precipitate another crisis in steam coal supply. Utah mines are averaging 2½ days per week.

No Break in Cincinnati

The balance struck between supply and demand in the Cincinnati market some weeks ago is undisturbed. Whatever surplus over and above regular commitments is mined finds a ready sale either at tide or with shippers who are falling behind in their lake shipments. Recent advances in the high-volatile trade have been maintained. As high as \$1.85 has been paid for Big Sandy and Thacker mine-run. There is practically no \$2 lump or block to be had. Egg is stronger.

In the low-volatile division, most of the distributors have been insisting upon \$3.25 for lump. That, or possibly \$3.50, will probably be the ruling price in the August circulars. Stove and nut, too, are firm. The \$2 price on mine-run hardly indicates the underlying strength. Local retail trade last week was the duldest in many days. The torrid weather was responsible. River business is in good shape.

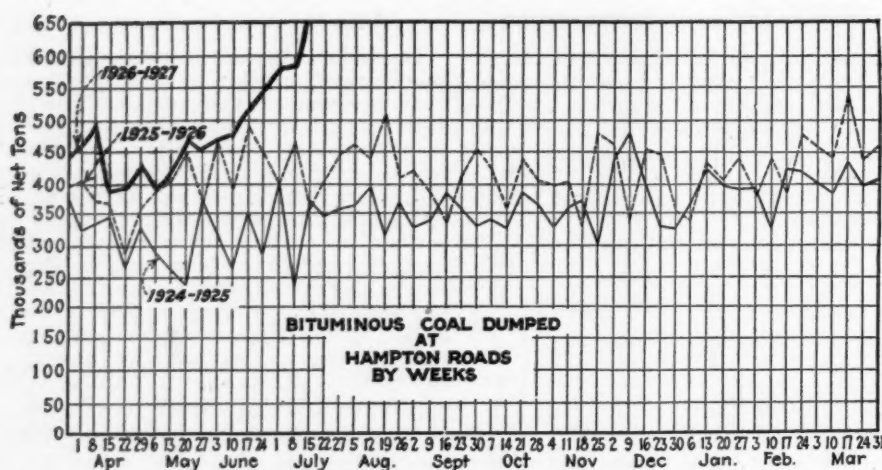
During the week ended last Saturday 14,137 coal loads were interchanged in the Cincinnati district—an increase of 1,830 cars over the preceding week and 648 cars over last year. The Louisville & Nashville and the Chesapeake & Ohio contributed 1,738 cars to the gain. Included in the total were 4,112 cars en route to Toledo and Sandusky for the lake trade. The interchange of



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	1926				1925	1924
Index	July 26	July 19	July 12	July 5	July 27	July 28
Weighted average price	159	157	158	158	160	163
	\$1.92	\$1.90	\$1.91	\$1.91	\$1.94	\$1.98

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States, weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke: 1913-1918," published by the Geological Survey and the War Industries Board.



Dumpings for week ended July 22 were 669,780 tons

empties en route to the mines—11,988 cars—showed an increase of 302 cars.

Central Ohio Easier

The heat wave and rural interest in the harvests slowed up the domestic trade in central and southern Ohio last week. City dealers and consumers, however, continued to take in coal. Steam business was marked by unrelieved dullness. Large consumers came into the open market only for immediate requirements despite depleted stockpiles. Railroads and public utilities were the backbone of the steam movement. Southern Ohio production has made no gain.

In northern Ohio the most cheering feature is the way in which slack prices on No. 8 coal are maintained. Largely because Ohio operators are out of the lake market, there is not the pressure of surplus fine coal of other years and demand in other quarters has made the pressure of West Virginia and Kentucky less heavy. Slack priced quotations advanced a dime; other No. 8 prices were unchanged last week. During the week ended July 17 the No. 8 field produced 193,000 tons, or 27.6 per cent of capacity. The output was 22,000 tons ahead of that for the week ended July 10 and 22,000 tons behind that for the week ended July 18, 1925.

Export sales of gas coal in the Pittsburgh district fell off last week, with no indications of an early resumption in buying. There have been rumors of the sale of steam coal for foreign account, but these cannot be substantiated on any appreciable volume of tonnage. The domestic demand is looking up, but the tonnage involved is small. Prices are steady. Production has been slowly expanding, with slight increases at union mines and substantial gains at the non-union operations.

Central Pennsylvania Still Gaining

Both prices and business were a shade better in central Pennsylvania last week. The improvement was credited to the British strike although operators complained that the southern fields were getting the lion's share of the foreign orders. Loadings for the week ended July 17 were 14,116 cars, as compared with 11,399 cars the week preceding. Prices on the higher rated low-volatile pools were up a nickel; quotations on pools 10, 11 and 18 were unchanged. Pool 1 was quoted at \$2.50 @ \$2.75; pool 71, \$2.30 @ \$2.40; pool 9,

\$2.15 @ \$2.30; pool 10, \$1.80 @ \$2; pools 11 and 18, \$1.60 @ \$1.70.

Buffalo bituminous business creates no excitement. It is conceded that tonnage is moving steadily, but the absence of superficial signs of activity depresses the traders. Quotations reveal no noteworthy departure from the nominal figures of several weeks' standing. Low-volatile lump is \$2.75 @ \$3.20; mine-run, \$2 @ \$2.50; slack, \$1.50 @ \$1.75. Fairmont lump is \$1.50 @ \$1.65; mine-run, \$1.30 @ \$1.45; slack, \$1.10 @ \$1.25; Youghiogheny gas lump, \$2.15 @ \$2.35; slack, \$1.20 @ \$1.30; Pittsburgh and No. 8 steam lump, \$1.65 @ \$1.85; slack, \$1.20 @ \$1.30; Westmoreland lump, \$2.50; slack, \$1.50.

New England consumers who counted upon a recession into tidewater prices have been disappointed. Although there has been no real improvement in demand for New England consumption, export and other domestic markets are keeping up the prices on low-volatile coals. Navy Standard f.o.b. vessel at Hampton Roads has jumped to \$4.55 @ \$4.70, with an occasional sale at \$4.75. It is predicted that this basis will continue as long as the British strike.

New England Prices Higher

This upward tendency also is reflected in quotations on coal for inland delivery on cars at Boston and Providence. At both ports, \$5.50 appears to be the minimum accepted for pool 1 coal and \$5.60 @ \$5.65 was asked on this week's business. Central Pennsylvania, however, has not shared in the stronger market. Neither all-rail nor tidewater quotations have advanced.

Current business in the New York

Car Loadings and Supply

	Cars Loaded		Car Shortages	
	All Cars	Coal Cars	All Cars	Coal Cars
Week ended July 17, 1926.....	1,083,626	183,486		
Week ended July 10, 1926.....	900,977	147,780		
Preceding week.....	1,072,624	172,713		
Week ended July 11, 1925.....	986,893	161,080		
	Surplus Cars		Car Shortages	
	All Cars	Coal Cars	All Cars	Coal Cars
July 8, 1926..	239,167	72,265		
June 30, 1926..	254,807	69,869		
July 7, 1925..	311,572	112,256		

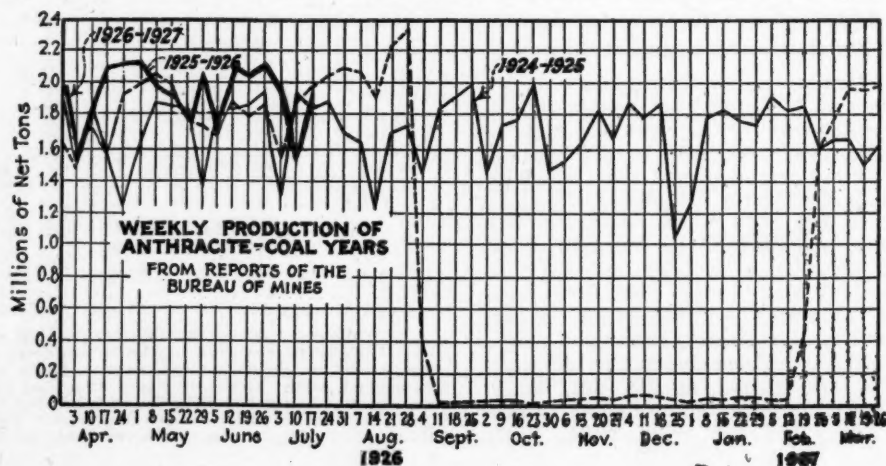
bituminous market is quiet, but great expectations are held for late August and early September buying. The tide-water market is in a fair condition; there is little distress tonnage to be picked up at the piers. More interest is shown by consumers patronizing the Philadelphia market and some of them are studying their storage reserves. Railroads, too, are taking larger tonnages. The only local reaction to British buying has been a hesitancy in naming Westmoreland prices for future delivery. Baltimore looks to July to break all export records at that port.

There is a good undertone to the Birmingham market, but spot buying is light. Production, however, is held in check so that there is little distress coal to plague the shippers and little instability to price quotations. Domestic coals are suffering from stop-orders, but prices are well maintained. Current spot and contract commitments seem to absorb coke production. Domestic coke is enjoying a good demand, with nut at \$3.25 @ \$3.50 and egg, \$4.50 @ \$5.

Better Outlook in Anthracite

A slight increase in orders for anthracite last week led New York observers to predict an early start to fall and winter buying. At the present time line trade is better than tide. Stove still leads in popularity and chestnut drags. Pea holds up in the face of advances in prices by two of the larger shippers. If anything, the spot steam market is better than it was a week ago.

Reports from Philadelphia, however, are less cheerful. Sharp concessions have been made to move blocks of independent nut. As a result, some buyers are deliberately staying out of the market in the hope that there will be further reductions. Retail dealers are heavily stocked. Egg coal lags behind stove and one company operator is plac-



ing egg in storage. Pea is plentiful. The steam market is giving all shippers much trouble, particularly in rice, although buckwheat is little better. The Baltimore hard coal trade is featureless.

The local Buffalo anthracite market is marking time. Dumpings for lake shipment during the week ended July 22 were slowed up by a breakdown at one of the piers. The total for the week was 80,000 tons, of which 42,500 tons cleared for the Head of the Lakes, 21,000 tons for Milwaukee, 14,000 tons for Sheboygan and 2,400 tons for Racine.

Connellsville Spot Prices Recover

Spot prices on small lots of Connellsville furnace coke went back to \$3 last week. It was still possible, however, to place orders for fair sized tonnages at \$2.75@2.85. Spot foundry coke quotations held at the \$4@4.50 range, with the average sales probably below \$4.25. Many operators are seeking outlets for raw coal, both for current and future movement.

Production in the Connellsville and Lower Connellsville region during the week ended July 17 was 126,750 tons, according to the Connellsville *Courier*. Compared with the preceding week this was a loss of 900 tons. Furnace-oven output was 70,200 tons, an increase of 1,900 tons. Merchant-oven production was 56,550 tons, a decrease of 2,800 tons.

Seek to Remove Causes of Industrial Accidents

Plans looking toward an intensive study of physical hazards in industry with a view to conclusions which will bring remedies and remove the causes of accidents were discussed in Washington July 14, 15 and 16, at the Industrial Accident Prevention Conference called by Secretary of Labor Davis.

Resolutions were adopted at the closing session favoring a plan of detailed industrial accident reports to some department of each state, these in turn to be forwarded to the U. S. Department of Labor. A bill to create in the Bureau of Labor Statistics a division of safety, to gather and study accident statistics, is pending before Congress with a favorable report in each branch.

Speakers at the conference stressed the need of more adequate statistics in order to judge more accurately the cause of accidents in industry, which Secretary Davis estimated are costing 23,000 lives and 2,500,000 injuries annually. Frank Morrison, secretary of the American Federation of Labor, using Secretary Davis' further estimate that 85 per cent of industrial accidents are preventable, said that 19,550 are killed and 2,125,000 injured needlessly each year. He estimated the annual wage loss due to accidents at a billion dollars.

Safety work in mines was told by W. W. Adams, of the U. S. Bureau of Mines, and T. F. Jennings, of the Utah Copper Co. Need of proper lighting was the subject of W. H. Rademacher, of the Edison Lamp Works.

Traffic News

Reduced Rates from Virginia To Southeast Effective

New freight tariffs by the Southern Ry. and the Carolina, Clinchfield & Ohio R.R., reducing rates on coal from the southwestern Virginia fields to points in Tennessee, Alabama, Georgia, Florida and other Southeastern territory, became operative July 21, when the Interstate Commerce Commission on that date refused to suspend them. In effect, the new rates place coal shipments over the Southern and Clinchfield between the territories affected on a parity with those of the Louisville & Nashville Ry., as stated in *Coal Age* last week (p. 121).

Suspension of the proposed new rates pending full investigation by the Commission of their necessity, in view of present facilities, and a comparative mileage, was requested of the Interstate Commerce Commission by the Southern Appalachian Coal Operators' Association, the Harlan County Coal Operators' Association and the Louisville & Nashville Ry.

Recommends Reduction in Southwestern Rates

In a report proposed by Examiner F. E. Mullen of the Interstate Commerce Commission in I.C.C. Docket 17385, *Albert Silk Coal Co. et al. vs. Santa Fe et al.*, he recommends a finding by the Commission that rates on bituminous coal from mines in Arkansas and Oklahoma to Topeka and Lawrence, Kan., are and will be unreasonable to the extent that they exceed \$2.80 per ton on lump and \$2.40 on slack coal from the Arkansas-Oklahoma group and \$3.05 a ton lump and \$2.40 on slack from the Spadra group. The rates on slack coal to Topeka from the same origins were found by the examiner not to be unreasonable, but the rates on lump coal to Topeka are unreasonable to the extent that they exceed \$2.95 from the Arkansas-Oklahoma group and \$3.20 from the Spadra group. Reparation should be awarded was the examiner's recommendation.

Cuts Southwestern Rates

A reduction of 50c. per net ton in the rates on bituminous coal from mines in southern Illinois and western Kentucky to a number of destinations in southeastern Missouri on the St. Louis-San Francisco, St. Louis Southwestern and Missouri Pacific railways and to Piggott, Ark., has been ordered by the Interstate Commerce Commission in *Scott County Milling Co. et al. vs. Butler County R.R. Co. et al.* Defendants objected to testing the reasonableness of the rates under attack by comparison with rates in effect to several west-bank Mississippi points on the ground that the use of these "depressed" rates as standards by which to measure rates to interior points would lead to wholesale reductions in rates to the Southwest generally, both from southern Illinois and from Alabama.

Urges Dismissal of Complaint By Chicago Merchants

Freight rates from western Kentucky, southern Indiana and Illinois to Chicago switching territory were held to be not unreasonable in a report to the Interstate Commerce Commission by Examiner Jewell. The Chicago Coal Merchants Association filed a complaint naming the Indiana Harbor Belt R.R., New York Central, Illinois Central, Chicago & Northwestern, Chicago, Milwaukee & St. Paul and other roads, and asked for reparation from March 1, 1920, to July 29, 1923. This case is not expected to have any bearing on the present complaint of the southern Illinois operators, who hold that rates from western Kentucky are too low as compared with rates from southern Illinois to Chicago and Northwestern points.

Say Rates Are Unjust on Slack From Western Missouri

Three coal mining companies operating in western Missouri, having headquarters in Pittsburg, Kan., have filed a complaint with the state Public Service Commission that the Burlington, Santa Fe, Missouri Pacific, Wabash, Kansas City Southern and other roads are charging unjust and unreasonable rates on crushed mine-run coal and slack shipped from their mines near Hume and Foster, Mo., to St. Joseph, Kansas City and other points.

Would Speed All-Rail Decision

The New England Governors' Fuel Committee and the Public Utilities Commission of Connecticut have filed motions asking the Interstate Commerce Commission to close the record in Docket No. 15006 in so far as it relates to the establishment or re-establishment of all-rail rates from southern West Virginia to the New England states. This action is petitioned in order that a decision on that part of the record may not be delayed by consideration of the reasonableness of and the relationship between rates to tidewater from the West Virginia and central Pennsylvania fields.

The record in the case was reopened for the taking of further testimony at Atlantic City, N. J., on June 21 and hearings came to a temporary end on July 2. The issues, prior to the hearing, were broadened to take in the tidewater rates and the evidence on this phase of the case had not been completed when the hearings adjourned.

Attack Rates to Southeast

Freight rates on coal from mines in Alabama, Georgia, Kentucky, Tennessee, Virginia and West Virginia to Wilmington, Charleston, Savannah, Brunswick and Jacksonville are unduly preferential to other consumers of coal at destination points in Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama and Tennessee, says a complaint filed with the Interstate Commerce Commission by the Traffic Association of South Atlantic ports.

Foreign Market And Export News

June Exports of Soft Coal Beat May by 622,456 Tons; Strike Bolsters Up Market

June exports of bituminous coal from the United States exceeded the totals for May by 622,456 gross tons. For the six months ended June 30, shipments of American soft coal to foreign buyers were 1,501,308 tons greater than in the first half of 1925, when 6,398,419 tons were exported.

Exports of anthracite showed a slight increase last month, but the totals for the half year (1,348,706 tons) are 305,496 tons less than during the first six months of 1925. Coke exports declined from 80,263 tons in May to 76,452 tons in June, but the total for the half year was 448,044 tons, compared with 351,895 tons for the corresponding period last year.

As usual, Canada is the largest foreign customer of the producers south of the international boundary line. In June the Dominion took 1,097,862 gross tons of soft coal, compared with 993,479 tons in May, while shipments to the United Kingdom were 439,233 tons as against 35,762 in May. Italy bought 109,377 tons in June compared with 66,194 tons for the preceding month.

The increased domestic production in France, together with imports from Germany, Belgium and Poland is reflected in the low purchases of France in the amount of 17,128 tons in June compared with the 31,523 tons pur-

chased from the United States in May. Norway came into our market in June, buying 2,405 tons.

Shipments to Egypt declined, having been 5,573 tons in June and 19,346 tons in May. Algeria and Tunis remained in this market, but shipments there also show a decline.

Small shipments were made to the Central American republics. Newfoundland and Labrador took 15,215 tons, Jamaica 18,277 tons, Trinidad and Tobago 3,421 tons, the French West Indies 10,114 tons.

A continuation from last month of shipments to coal depots may be noted as well as the growing self-sufficiency of Continental Europe. A restoration to normal or near-normal production in Germany and Poland and increased production in France, Spain, Belgium and the Netherlands are largely responsible for our light shipments to Europe as compared with shipments made during the last strike period in the British coal industry.

Detailed figures on June exports are shown in the accompanying table.

Export Clearances Week Ended July 22

FROM HAMPTON ROADS

For United Kingdom:	Tons
Nor. Str. Mareta.....	2,513
Br. Str. Baron Judburgh.....	7,713
Dan. Str. Dansborg.....	6,810
Ital. Str. Rovereto.....	6,733
Br. Str. Bradclyde.....	7,713
Br. Str. Bradburn.....	7,063
Br. Str. Ocean Transport.....	7,114
Span. Str. Atalaya.....	5,026
Br. Str. Baron Elibank.....	3,482
Br. Str. Ovid.....	5,106
Br. Str. Nethergate.....	6,758
Br. Str. Rexmore.....	7,242
Jugo-Slav. Str. Nikola Mihonovic.....	7,323
Br. Str. Miguel de Larrinaga.....	7,044
Br. Str. Buckleigh.....	7,559
Br. Str. Golden Cape.....	7,007
Br. Str. Cornish City.....	7,097
Span. Str. Unbe Mendi.....	5,609
Ital. Str. Nordico.....	9,124
Br. Str. Vincenzo Florio.....	9,550
Span. Str. Arte Mendi.....	4,771
Br. Str. Hannington Court.....	7,594
Br. Str. Merioneth.....	7,509
Br. Str. Penrose.....	5,698
Br. Str. Teviot.....	4,000
Jugo-Slav. Str. Izabrab.....	6,608
Br. Str. Conlstone.....	7,060
Grk. Str. Anna.....	7,556
Br. Str. Corinthic.....	8,031
Belg. Str. Trevier.....	6,686
For Brazil:	
Br. Str. Tregliss, for Rio de Janeiro	6,190
Amer. Schr. Ida S. Dow, for Pernambuco	1,995
Br. Str. Dovenby Hall, for Rio de Janeiro	5,834
Br. Str. Thistleto, for Rio de Janeiro	5,914
Br. Str. Tregantle, for Rio Grande do Sul	6,239
For England:	
Br. Str. Geddington Court, for Manchester	6,749
Br. Str. Vittorio, for Hull	4,155
Br. Str. New Brooklyn, for Liverpool	8,245
For Canary Islands:	
Ital. Str. Lodovica, for Tenerife	5,028
Grk. Str. Agnois Gerasimos, for Tenerife	5,009
For Nova Scotia:	
Br. Schr. Montclair, for Riverfort	606
For Wales:	
Nor. Str. Flint, for Cardiff	6,509
For Algeria:	
Amer. Str. Careno, for Oran	5,960
For Italy:	
Ital. Str. Guilla, for Venice	482
For Jamaica:	
Nor. Str. Commadore, for Kingston	1,484

Nor. Str. Sydford, for Kingston	3,532
For Cuba:	
Swed. Str. John Lundwall, for Havana	3,040
Amer. Str. Callabastos, for Guantanamo	2,952
For Ireland:	
Swed. Str. Nuolja, for Queenstown	9,970
Du. Str. Spar, for Queenstown	5,962
For Scotland:	
Ital. Str. Valrossa, for Glasgow	6,680
Br. Str. Ellaston, for Glasgow	6,145

FROM BALTIMORE

For Italy:	
Ital. Str. Mediterraneo, for Venice	6,759
Ital. Str. Dalmazie, for Genoa	9,015
Ital. Str. Armando, for Savona	7,149
Br. Str. Hydasper, for Civitavecchia	5,405
For Ireland:	
Span. Str. Arno Mendi, for Queens-town for orders for England	7,340
Br. Str. Misty Law, for Queenstown for orders for England	7,086
Br. Str. Alistruther, for Queenstown for orders for England	5,847
Br. Str. Hesleyside, for Dublin	6,481
Br. Str. Petersham, for Cork	5,724
Br. Str. Bradford City, for Queens-town, orders for England	7,171
Am. Str. Henry D. Whiton, for Queens-town, orders for England	5,869
Ital. Str. Sursum Corda, for Queens-town, orders for England	7,897
Br. Str. Hopeland, for Queenstown, orders for England	7,157
Br. Str. Devon City, for Queenstown, orders for England	7,013
Br. Str. Putney, for Dublin	5,171
Br. Str. Trafalgar, for Queenstown, orders for England	8,649
Br. Str. Ashworth, for Queenstown, orders for England	7,451
Br. Str. Falls City, for Queenstown, orders for England	7,022
Br. Str. Northlea, for Queenstown, orders for England	4,553
Jap. Str. Buyo Maru, for Queenstown, orders for England	7,517
Br. Str. Oakland Grange, for Queens-town, orders for England	7,101
Gr. Str. Margarita Calafatis, for Queenstown, orders for England	4,297
For England:	
Ital. Str. Angelo Toso, for Lands End for orders	7,180
Span. Str. Gastelu, for Manchester	4,862
Ger. Str. Simon von Utrecht, for Birkenhead	8,469
Br. Str. Kamir, for Lands End	6,307
Nor. Str. Bjornefjord, for Lands End for orders	5,517
For France:	
Ital. Str. Monte Nero, for Havre	6,686
Gibraltar:	
Ital. Str. Antarico, for Gibraltar for orders	9,772

Hampton Roads Coal Dumpings*

(In Gross Tons)

	July 15	July 22
N.&W. Piers, Lamberts Pt.		
Tons dumped for week	218,999	220,511
Virginian Piers, Sewalls Pt.		
Tons dumped for week	166,899	155,139
C&O Piers, Newport News:		
Tons dumped for week	204,948	222,367

*Data on cars on hand, tonnage on hand and tonnage waiting withheld due to shippers' protest.

Pier and Bunker Prices, Gross Tons

PIERS		July 17	July 24†
Pool 1, New York	\$5.40@	\$5.65	\$5.40@
Pool 9, New York	4.90@	5.15	4.90@
Pool 10, New York	4.60@	4.85	4.60@
Pool 11, New York	4.35@	4.50	4.35@
Pool 9, Philadelphia	4.85@	5.20	4.85@
Pool 10, Philadelphia	4.60@	4.85	4.60@
Pool 11, Philadelphia	4.30@	4.55	4.30@
Pool 1, Hamp. Roads	4.45@	4.50	4.50@
Pool 2, Hamp. Roads		4.25	4.35@
Pool 3, Hamp. Roads		4.00	4.10@
Pools 5-6-7, Hamp. Rds.		4.10	4.15@
BUNKERS			
Pool 1, New York	\$5.65@	\$5.90	\$5.65@
Pool 9, New York	5.15@	5.40	5.15@
Pool 10, New York	4.85@	5.10	4.85@
Pool 11, New York	4.60@	4.75	4.60@
Pool 9, Philadelphia	5.10@	5.35	5.10@
Pool 10, Philadelphia	4.90@	5.10	4.90@
Pool 11, Philadelphia	4.55@	4.85	4.55@
Pool 1, Hamp. Roads		4.50	4.60
Pool 2, Hamp. Roads		4.25	4.40
Pools 5-6-7, Hamp. Rds.		4.10	4.25

†Advances over previous week shown in heavy type; declines in italics.

U. S. Fuel Exports in June

To	Anthra-cite, Gr. Tons	Bitumi-nous, Gr. Tons	Coke, Gr. Tons
Azores and Madeira Islands.....		6,523	
France.....		17,128	
Gibraltar.....		10,734	
Italy.....		109,377	500
Norway.....		2,405	
Portugal.....		5,638	
Turkey in Europe.....		5,390	
United Kingdom.....		439,233	
Canada.....	380,810	1,097,862	74,837
British Honduras.....		3	
Costa Rica.....		4,011	
Guatemala.....		6	7
Honduras.....		168	
Nicaragua.....		854	15
Panama.....		41,161	81
Salvador.....		2	6
Mexico.....	144	9,595	151
Newfoundland and Labrador.....		1,605	
Jamaica.....		18,277	
Trinidad and Tobago.....		3,421	
Other British West Indies.....			20
Cuba.....		3,422	697
Dominican Republic.....			11
French West Indies.....		10,114	
Virgin Islands of United States.....		3,742	
Argentina.....		94,951	23
Brazil.....		99,165	65
Colombia.....		518	
British Guiana.....		1,128	
Dutch Guiana.....		200	
Uruguay.....		21,782	
Venezuela.....		4	20
Philippine Islands.....			50
Egypt.....		5,573	
Algeria and Tunis.....		3,597	
Other French Africa.....		17,401	
Portuguese East Africa.....		7,178	
Canary Islands.....		37,266	
Total.....	386,043	2,139,166	76,452

Coming Meetings

Fourth Annual West Virginia First-Aid Contest and First Annual Safety Day, Camden Park, Huntington, W. Va., Aug. 21. Managing Director, W. H. Forbes, Federal Building, Huntington.

Fifth International First-Aid and Mine-Rescue Contest, San Francisco, Calif., during the first week of September, 1926, under auspices of Bureau of Mines, Department of Commerce.

New York State Coal Merchants Association. United States Hotel, Saratoga Springs, N. Y., Sept. 2-4. Executive secretary, G. W. F. Woodside, Dolan Bldg., Albany, N. Y.

Rocky Mountain Coal Mining Institute. Glenwood Springs, Colo., Sept. 9-11. Secretary, Benedict Shubart, Boston Building, Denver, Colo.

American Institute of Mining and Metallurgical Engineers. Oct. 6-9, at Pittsburgh, Pa. Secretary, H. Foster Bain, 29 West 39th St., New York City.

National Safety Council. Oct. 25-29, at Detroit, Mich. Managing director, W. H. Cameron, 108 East Ohio St., Chicago, Ill.

National Industrial Traffic League. Commodore Hotel, New York City, Nov. 17 and 18. Executive secretary, J. W. Beek, Chicago, Ill.

Coal Mining Institute of America. Annual meeting, Chamber of Commerce, Pittsburgh, Pa., Dec. 8, 9 and 10. Secretary, H. D. Mason, Jr., Box 604, Ebensburg, Pa.

Publications Received

Handbook of Safety and Accident Prevention, by Fred G. Lange. The Engineering Magazine Co., New York City. Pp. 512; 6x9 in.; illustrated. Price, \$5.

The Electric Ignition of Firedamp: Alternating and Continuous Currents Compared, by R. V. Wheeler. Safety in Mines Research Board, Paper No. 20. H. M. Stationery Office, London, England. Price 1s. net. Pp. 18; 6x9½ in.; illustrated. Compares alternating with continuous currents with respect to the ability of their "break-flashes" to ignite firedamp.

The Limits of Inflammability of Fire-damp in Atmospheres Which Contain Blackdamp, by H. F. Coward and F. J. Hartwell. Safety in Mines Research Board, Paper No. 19. H. M. Stationery Office, London, England. Price, 6d. net. Pp. 11, 6x9½ in.; illustrated.

The Rock Dust Remedy, by Harry Phythyon. (An open letter to the operators in the 27th bituminous district of Pennsylvania.) Belle Vernon Agency, Belle Vernon, Pa. Price, \$2. Pp. 190; 5½x8 in.

Saward's Annual, 1926, by Frederick W. Saward, assisted by James P. Mahoney, Guy H. Burbank and the editorial and office staff of *Saward's Journal*, New York City. Price, \$2.50. Pp. 256; 6x8 in.; tables. A statistical review of the coal trade.

Fuel Briquets in 1924, by W. F. McKenney. Bureau of Mines, Washington, D. C. (Pages 187-192 of *Mineral Resources of the United States—Part II*.) Tables and charts. 5c.

New Equipment

Bearing Has Oil Circulation And Filtration Features

A bearing now being manufactured and distributed by the Willamette Iron & Steel Works, Portland, Ore., possesses the dual features of automatic circulation and filtration of the oil. Behind the bearing surface a reservoir is provided, from which the oil passes, through small feed passages, to the shaft. At each end of the bearing are provided oil-return ducts, filled with wool waste, through which the oil is filtered. These ducts connect with the oil reservoir, and a definite circulation of lubricant is established and maintained. A feature of the bearing is a provision so that the part subjected to the greatest pressure and the greatest friction gets the largest quantity of oil. The results are said to be an unusual freedom from bearing trouble and a significant saving in the consumption of oil.

These bearings are being manufactured in flat-bottom, internal-collar, drop-hanger, rigid-post ball-and-socket, and various other types for special purposes to accommodate all shaft sizes.

Small But Precise Calculator

A calculator which was introduced from England a year ago is now being sold in the United States by the A. S. Aloe Co., of St. Louis, Mo., exclusively. This is the Otis King calculator, an instrument which in pocket size (6 in. when closed) provides, it is said, the calculating facilities of an ordinary slide rule 66 in. long, with a correspondingly high degree of accuracy. Accurate results to four or five significant figures can be obtained, the distributor asserts. Owing to its simplicity it is easy to learn to use it.

The calculator consists of two metal tubes, the smaller (cylinder) being free to rotate and slide within the larger (holder). Spiral scales are mounted on each of these tubes, and a third tube mounted on the holder forms a tubular cursor, or indicator, carrying at each end an engraved arrow, which can be set to any mark, or to which any mark can be set. The three parts of the instrument are inseparable, and being made of metal throughout there is no possibility of their warping, or being affected in any other way by climatic conditions.

Three metal sprags on the top of the holder keep the indicator in position and prevent it from touching the scales. The bottom end of the cylinder is



Spiral Scale for Close Results

The use of the spiral for slide rules is not new but other details in this calculator are. Though only 6-in. long it is said to give four or five significant figures.

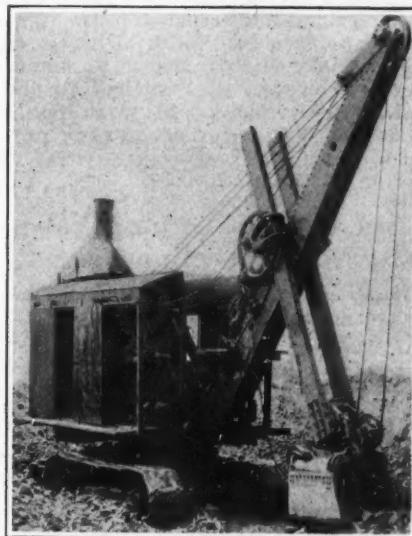
covered with velvet, which holds it firmly in position and prevents chafing of the top scale between the two tubes. All exposed metal parts are heavily nicked.

The scales are produced photographically on a special material, which has an extremely hard waterproof surface. The size of the instrument, fully extended, is 10x1½ in.; closed, 6x1½ in.

Shovel Definitely Designed For One-Yard Capacity

The Bucyrus Co., of South Milwaukee, Wis., has recently announced a new steam shovel, the 31-B. It is a one-yard full-revolving shovel for contractors and general use.

Contact with shovel users has shown that the excavating tool most in demand today is a one-yard shovel with



Shovel for General Purposes

Built with only one-yard capacity service in view, this shovel has clearances enabling it to work to advantage in narrow cuts.

very definite qualities. Accordingly, the 31-B has been built to meet these conditions. The over-all dimensions of the shovel are no greater than those of most ¾-yard shovels built today, but this new shovel is a real one-yard shovel, built from caterpillar track to boom sheave for work with a one-yard dipper. Thus built, the clearances of the shovel are such that it can maneuver in and out of odd corners handily and work to advantage in extremely narrow cuts. The rear-end radius is just 9 ft. 6 in.

The machine is built to cut a level floor 16 ft. 7 in. wide, dig 4 ft. 11 in. below grade and dump 12 ft. 6 in. above the floor level either to spoil or in trucks. It has abundant strength and power. All Bucyrus features are retained in the design, which, it is said, has been worked out in close co-operation with men in the field. These include an outside dipper handle, the box-girder boom, two-part hoist direct-

connected to dipper, unobstructed dipper opening, swing engine mounted in front and Bucyrus caterpillars, having big idlers and bearings high out of the mud and continuous treads with no gaps between links.

The shovel is also available as a high-lift shovel of one-yard capacity dumping 18 ft. above the floor, and extra high lift, $\frac{3}{4}$ -yard dipper, that reaches its extreme dumping height of 21 ft. 7 in. It is quickly and easily convertible to a dragline, with a 40-ft. boom. It is also offered as a sewer excavator, clamshell or crane.

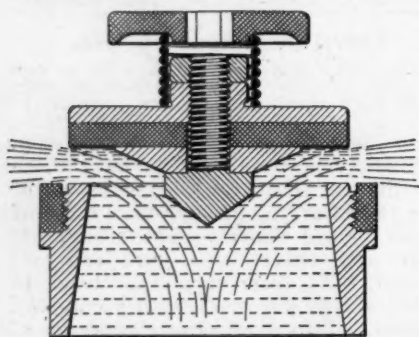
Low-Density Makes Explosive More Effective

A new permissible explosive known as Monobel No. 10 L. F. has been developed by E. I. du Pont de Nemours & Co., of Wilmington, Del. It has passed all tests of the Bureau of Mines for permissible explosives and has been given extensive field trials.

This new permissible is said to represent a distinct advance in the art of manufacture, being of lower density than any others now available. In water resistance, keeping qualities, resistance to freezing, and sensitiveness, it is similar to Monobel No. 9. Because of the lower density attained in its manufacture, however, it is believed by the manufacturer that it will prove highly economical and an excellent lump producer in thin beds of coal.

Light Four-Part Pump Valve Decreases Slippage

Pump valves have been greatly improved during the past few years, one of the latest refinements being represented by the Williams-Bullen pump valve shown in the accompanying illustration. It is manufactured by the Williams Gauge Co., of Pittsburgh, Pa. The designers and builders of this valve have embodied many details essential for maximum efficiency. It is unusually



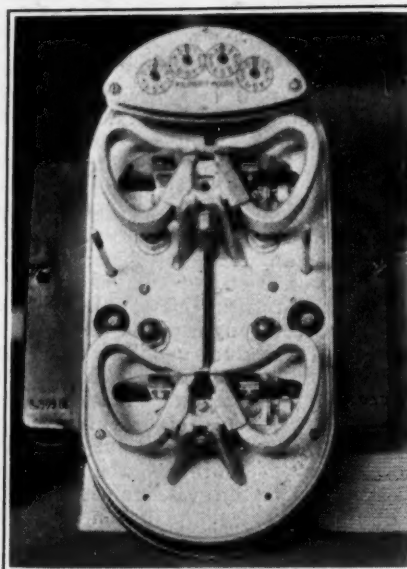
Cross-Section of New Valve

This shows the valve in its operating position and well illustrates its simplicity. Note how the water is guided between the valve and its seat, thus reducing friction.

strong and sturdy and possesses great simplicity having only four working parts. In order to make the valve as sensitive as possible it is made of light weight so that its action is practically instantaneous. Slippage amounts to next to nothing and many of the troubles to which the older designs of valves were subject are claimed to be absent in this piece of equipment.

Lamp on Watthour Meter Shows Circuit Is Open

In order to show that the potential coils of the instrument are energized, an indicating device has been introduced by the General Electric Co. on its



Lamps Show Condition of Meter

One light is provided for each meter element. If this fails to burn it is a sign to the attendant that something is wrong and that the instrument is not working as it should. The difficulty may thus be quickly located and corrected.

type D-7 polyphase watthour meter. On the ordinary meter of this kind an interruption in the potential circuit is not always easy to detect; a blown fuse may go unnoticed for some time, and in the meanwhile the instrument registers only a portion of the power it is supposed to measure.

In the new instrument a few turns have been taken around the outside of the potential coil of each element. These serve as a transformer to energize a small, low-voltage lamp on the front of the meter, one such lamp being employed for each element. If one of these lamps fails to burn it signifies an open potential circuit which by this means may be promptly detected by the meter reader or operator and corrected with a minimum loss of time.

Trade Literature

Economy Pumping Machinery Co., Chicago, Ill., recently issued the following: Centrifugal Double Suction Pumps, bulletin 404, 12 pp., illustrating and describing three types of double suction pumps; Centrifugal Vacuum Boiler Feed Pumps, 12 pp., describing their application, types, advantages, specifications and construction; Pumps and Receivers, bulletin 405, 16 pp., briefly describing a line of electric pumps and receivers for various conditions and pressures; Portable Pumping Unit, four-page folder describing the 3-in. type "FHS" centrifugal pump driven by a 5 hp. New-Way gasoline-kerosene engine. These are all $8\frac{1}{2}$ x 11 in. accompanied by tables and illustrations.

The Manierre Engineering & Machinery Co., Milwaukee, Wis., has issued a 56-pp. catalog illustrating and describing its box-car loading machinery.

Jenkins Bros., New York City, has issued a 4-pp. folder giving a detailed description of its Fig. 700 Modulating Valve. Illustrations and price-list are included.

General Equipment Catalog No. 24, issued by the Nashville Industrial Corp., Old Hickory, Tenn., 80 pp., illustrated.

Three recent publications of the Sullivan Machinery Co., Chicago, Ill., are "Quickset" Drill Carriage for Tunneling, bulletin No. 81-L, illustrating and describing a convenient means for mounting hammer or rock drills for use in tunnels; Electric Portable Hoists, bulletin 76-G, designed for use where electric wires are strung to the work to be done or where air power is not available; Belt-driven Air Compressors, bulletin No. 83-B (second edition), describing single- and two-stage compressors.

Steel Ties for Mines and Industrial Track. Bethlehem Steel Co., Bethlehem, Pa. Booklet 31-A. 34-pp., 9x6 in.; illustrated. Describes the Standard mine tie, for use in mines where the rail sections have been largely standardized; the Universal mine tie, designed for mines where rail sections have not been standardized; and steel ties with bolted clips for use in more or less permanent locations. Tables for weights and lengths for various gages are included.

Gear Problems and IXL Speed Reducers. Foote Bros. Gear & Machine Co., Chicago, Ill. Catalog No. 200, 621 pp., 5x7 $\frac{1}{2}$ in.; illustrated; tables. This is a handy reference book to engineering information on various subjects, being indexed by subjects in the upper page corners and with a cross reference index in the back of the book.

The Ohio Brass Co., Mansfield, Ohio, has issued a Rail Bond Welding Instruction Poster describing the difference between the metallic steel and metallic copper arc-welding processes.

M-R-C Thrust Bearings. Marlin-Rockwell Corp., Jamestown, N. Y. 36 pp.; 4x7 in.; illustrated; tables. Contains dimensions, load ratings and price lists.

Centrifugal Sand Pump. A. R. Wilfley & Sons, Denver, Colo. Catalog 5, 29 pp.; 6x9 in.; illustrated. Describes the operation and construction of this model C sand pump.

24-Hour Concrete. The Atlas Lumnite Cement Co., New York City. 31 pp.; 6x9 in.; illustrated.

Chicago Pneumatic Tool Co., New York City, has issued two circulars, one describing and illustrating its Little Giant Universal Drills, Screw Drivers, Nut Runners and Tappers, and the other its Little Giant Grinder, No. 33.

The Galion Iron Works & Mfg. Co., Galion, Ohio, has issued three bulletins on its Belt Conveyor, Monorail Conveyor and No. 89 E-Z Lift Grader. These are $8\frac{1}{2}$ x 11 in., illustrated.